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THE FOUNDRY

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Trade Outlook.

It is doubtful if the foundries of the United States ever witnessed such a prosperous year as the one just closed. In all lines of manufacture the demand for castings has been unprecedented, and every foundry entitled to bear that name in a commercial way has found work in plenty. The foundry capacity of the country has been vastly increased during the past twelve months, not only by the addition of new shops, but through enlargements of existing plants. This extension applies to all branches of the trade.

The year 1901 is remarkable for the uniform prices sustained during a long period of great activity. More business has been done than in boom times and yet there has been an entire absence of boom prices, except in so far as prices for urgent deliveries have at times commanded a premium. It was predicted earlier in the year that the supply of pig iron would be in excess of demand through added blast furnace capacity; but these expectations have not been realized and instead we find the year closing with smaller stocks than it began with, and no indication that anything in the immediate future will change this condition. It is true that new furnaces have been put in blast, but their output has almost entirely been absorbed by the steel industry, leaving the foundry end of the iron trade to get along as best it could.

During the year the foundries as a rule have followed the policy of only carrying stocks enough to cover their immediate requirements, and much confusion has been caused where shops have been compelled to change their mixtures. In most instances it has been a case of taking whatever iron could be obtained with but little if any room for selection. The increased knowledge of chemistry has been of untold benefit to many foundrymen under these circumstances and yet it must be remembered that but few shops are so situated that they have been enabled to avail themselves of the full benefit of chemical analysis in making their mixtures. For the greater part the foundryman relies on the furnace to furnish a correct analysis of the iron it ships him and we all know that all furnaces do not do so. The suggestion has been made that foundrymen should refuse to patronize furnaces which can not, or will not, guarantee the chemical contents of their iron within certain limits, but this idea is impracticable and impossible to carry out when every pound of iron that can be made is eagerly taken.

New appliances and methods continue to come to the foundry for the good of all. Although the day when muscular strength shall be a second consideration in our shops is far distant, yet much is being done to eliminate this as much as possible. The mere ability to strike strong blows will not be as necessary a qualification for a molder a few years from now as it is today. As tending to show the direction of inventive genius in the foundry we will say that we observed the other day designs for a machine intended to "cut over" sand and it is likely that it will soon be placed on the market, and with the aid of a motor will do as much of this kind of work as several laborers and do it better.

The relation between the foundryman and his employes has been uniformly pleasant

during 1901. The Cleveland controversy was settled early in the year and with the exception of the general mix-up at Chicago, which, from the molders' standpoint at least, can not be considered official, nothing has occurred to warrant much comment. Differences have, of course, arisen at other points, but their origin and settlement were largely local affairs. The coremakers, patternmakers, and brass molders, each with a separate organization, have made considerable headway in uniting the members of each craft under a central head. One phase of the labor difficulties which have happened between the molders and their employers, has been the almost universal attempt by the latter to increase the sphere of molding machines in their respective establishments. Considerable success has attended their efforts and the scope of the machine has been extended to a better class of castings than heretofore, in fact, to castings of which hand molding was believed to have a monopoly. While a man of average intelligence will be able to turn out certain castings on a molding machine after a few days' instruction, it does not follow that on the more complicated castings this will hold good. The foundryman who will judge the possibilities of each molding machine by itself will have the greatest returns from their use.

In all the leading foundry centers advances in the rate of wages have been made to employes. This may not have taken the form of a universal increase, but in a lot of cases the advance has been made to individuals. The prices of castings have also advanced to a certain extent, especially in branches of the trade working on specialties, several of which are favored with trade agreements, tending to steady prices. The soil-pipe manufacturers have had a gentlemen's agreement for more than a year which has worked well and will probably be continued indefinitely. Attempts have been made in other branches to bring about an understanding in regard to selling prices and territory, with more or less success. The jobbing foundries, however, remain the last to be won to the idea of organization and protection. Instances are not lacking, even in these busy times, where jobbing foundries have made exceptionally low bids on castings when their plants have had more work than they could handle. This, of course, would simply have the effect of keeping some other shop from obtaining a fair price. This is strange, when it is considered that there is plenty of work for all shops, and that prices can be obtained which will yield a fair profit, if the general inclination to knife competitors could be eliminated.

Conflicting Interests.

Where one trade ends and another has its beginning occasionally becomes a matter for dispute between trades unions. The building trades have been peculiarly unfortunate in being the battle ground for the settlement of differences of local interest between trades, and the same bone of contention has also come up in one form or another in other directions.

The specialization of work has not only split our industries up into distinct trades, which years ago overlapped one another, but it has also done much to divide each trade into sections. We are all aware that the molding trade knows a dozen different divisions, such as car wheel, radiator, bath tub, bench, machinery, machine, stove, agricultural, brass, malleable, etc., the workmen in each branch being at their best in their special line, and not constituting all around mechanics, who can readily be transferred to any class of work. Fortunately all branches of the trade are, with one exception, under the control of one central organization, the Iron Molders' Union of North America. The exception is the brass molders, who in many cities have locals of their own, affiliated with the Brass Workers, Metal Polishers, Buffers and Platers' Union.

It seems that the brass molders of Great Britain have also refused to come under the protection of the two parent organizations of molders, the Associated Iron Molders of Scotland and the Friendly Society of Iron Founders of England, Ireland and Wales. It also appears that the brass molders have attempted to keep other molders from encroaching on their field, contending that shops having special departments for the casting of brass should only employ members of the brass molders' union therein. On the other hand the iron molders' unions have insisted upon their right to work at any branch of the trade, a privilege which has been theirs from the earliest times. In one case a number of brass molders struck because their foreman was an iron molder.

In any factional dispute of such a character the employer is the one who suffers innocently. Technically the first-class molder should be able to do any part of foundry

work, the making of brass castings and cores included. It remains yet to be seen if the Coremakers' and Brass Molders' Unions will insist on cornering these branches of the trade for themselves to the exclusion of the general molder.

A Blast Furnace Record.

Probably but few of our readers are acquainted with the performance of modern blast furnaces, and to give a fair idea of their capacity we reproduce the following details of a 24-hour run recently made by No. 3 furnace of the Carrie group, as given by the *Iron Trade Review:*

A new world's record for blast furnace production was made by No. 3 furnace of the Carrie group of the Carnegie Steel Co., at Rankin, Pa., on Nov. 20, when 790 tons of basic iron was made in a 24-hour run, exceeding the best previous record, made by one of the Duquesne stacks of the same company, by 59 tons. The No. 3 Carrie stack is one of the two new furnaces built since the Carnegie Steel Co. acquired the Carrie property, both being planned for a minimum capacity of 700 tons per day. The furnaces are 100 feet high and 23 feet diameter in the bosh and are equipped with 12 tuyeres. During the blast of Nov. 20 when the great record was made an average pressure of 21 pounds was maintained. The furnace was worked on non-Bessemer ores running from 52 to 58 per cent in iron and 0.1 phosphorus. Casts were made every four hours. One cast required ten ladles and yielded 168 tons. A total of 2,270 tons of material was charged during the 24 hours, including 1,450 tons of ores and cinder, 660 tons of coke and 160 tons of limestone. The metal was conveyed in ladles across the river to the Homestead steel works. No effort has been made to reach the maximum capacity of No. 4 furnace, but it is probable that the performance of No. 3 will be equaled or exceeded. The average cast netted 115 tons; and it required 1,871 pounds of coke to make each ton of iron. George K. Hamfeldt is superintendent of the Carrie plant.

Nearly every one of our advertisers are busy sending out calendars, diaries and other kinds of mementos to their customers. If you do not receive your share write them to send it on. None of them intend to overlook you at this time of the year.

The Foundry Foreman and His Employer.

At a recent meeting of the National Founders' Association, President Hoyt referred to the value of having foundry foremen thoroughly loyal to their employers' interests, and capable of conducting the affairs of a shop even under adverse conditions. He said that members of the association, who have had differences with their molders, have had the greatest success in securing a new set of satisfactory employes, where the assistance of the foreman had been secured.

The foundry foreman is generally a graduate of the sandheap. In order to possess the ability to give instructions to others, be they apprentices or journeymen, he must have an intimate knowledge of molding, something not obtainable except through actual contact with the trade. The foreman is acquainted with all the minor shop complaints, which reach him from time to time, and if he is careful and disposes of each as it comes, he is doing his employer a good turn. As a rule serious differences do not arise between employer and employe all at once. It is the accumulation of insignificant complaints which finally lead to an outbreak.

A foundry foreman, no matter how competent he is, can not secure from a set of new men, many of whom may be incompetents, the same results that he can from an experienced and tried set of workmen. Is it not true that too often under such circumstances the employer simply counts noses instead of considering the quality of the workmen the foreman has to utilize, and looks for the same output from his new employes? Failing to receive this he is apt to charge sympathy with old employes on the foreman's part as the reason for fewer, and probably worse looking, castings. Sympathy often does exist, and in many cases is well founded, yet the average foreman will do his best to treat all concerned with some show of justice.

Where the employer makes a mistake is, in not taking the foreman of the foundry into his confidence from the start. The only communication between some shop proprietors and their foremen takes place when an increase in output is desired or fault is found with the product of the foundry in one form or another. A word of encouragement spoken at a time when this is not exactly needed will do more to secure the foreman's co-operation than appeals made when trouble is at hand.

The American Malleable Casting Company.

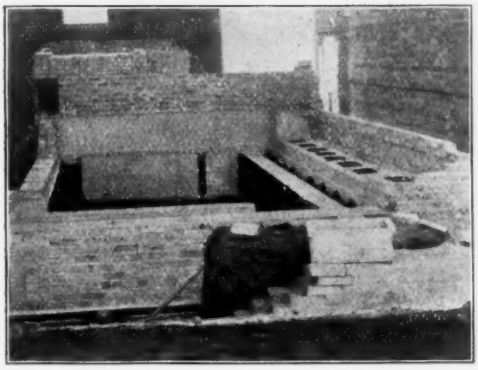
Among the newcomers in the malleable branch of the trade one of the most prominent concerns is the American Malleable Casting Company, whose plant is located at Chicago Highlands, a short distance from Barrington Station on the Wisconsin division of the Chicago & Northwestern Railroad, and about thirty miles from Chicago. The buildings were designed by M. J. Morehouse of Chicago and are of a very substantial character, having brick walls and steel truss roofs. Light and ventilation has been carefully considered, especially in the foundry proper, which is 110 ft. in width by 300 ft. long, and provided the entire length of the central portion with a lantern roof 10 ft. high and 48 ft. wide.

Our illustration of the plant shows in the foreground a separate two-story building 40x 110 ft. in size. The lower part of this is a fireproof vault in which all patterns will be stored, while the upper story will be utilized as a pattern shop and for such office work as will have to be taken care of at the plant, the general offices will continue to be at the Chamber of Commerce Building, Chicago.

The plant is so arranged that the work ad-

PLANT OF THE AMERICAN MALLEABLE CASTING CO., CHICAGO HIGHLANDS, ILL.

INTERIOR OF FOUNDRY DEPARTMENT, AMERICAN MALLEABLE CASTING CO.

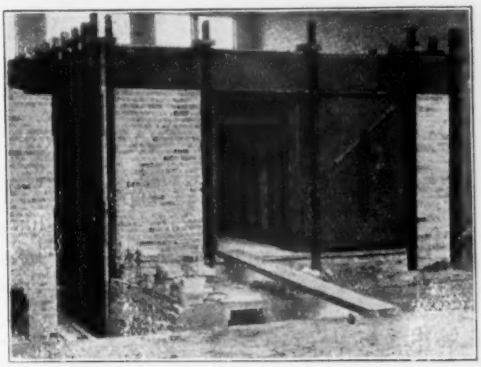


FOUNDATION OF ANNEALING OVEN, AMERICAN MALLEABLE CASTING CO.

vances continually in one direction from pattern room to foundry, cleaning room, annealing room, finishing and shipping department. Railroad tracks extend the full length of the main building so that raw material may be unloaded at the most convenient point to where it is to be used. A separate track is provided for the loading platform from the shipping department, thus avoiding delays and annoyances which usually occur when loading and unloading has to be done from the same track.

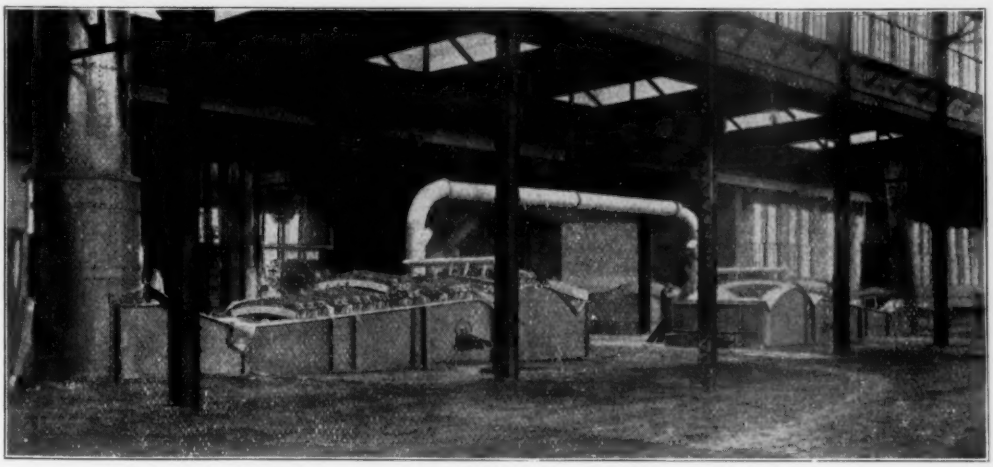
The molding room contains two 12-ton reverberatory furnaces, close to which is a 54" Whiting cupola, which will be used for making such gray iron castings as are needed. The cupola is located in a two-story annex, 43 by 212 ft., which also contains the core room and the power plant, consisting of two 50 horse-power Maywood gas engines, and two 40 k. w. electric generators, from which current is furnished to seven motors located in various departments for operating pressure blower, tumbling barrels, elevator to charging platform, etc. A system of narrow gauge tracks connect all departments on which cars will be operated by electric power through an overhead trolley.

The central space of the molding room is intended to be occupied by such castings as require to be molded on the floor, the bench molders being distributed along the walls. Arrangements are made so that an electric traveling crane having a span of 48 ft. and commanding the entire center of the shop, may readily be installed if the class of work should require this.



ONE OF THE ANNEALING OVENS, AMERICAN MALLEABLE CASTING CO.

From the molding room the castings pass to the cleaning room, 40 by 110 ft., and then to the annealing room, 110 by 200 ft. On one side of this is the annealing ovens, which are



REVERBERATORY FURNACES, AMERICAN MALLEABLE CASTING CO.

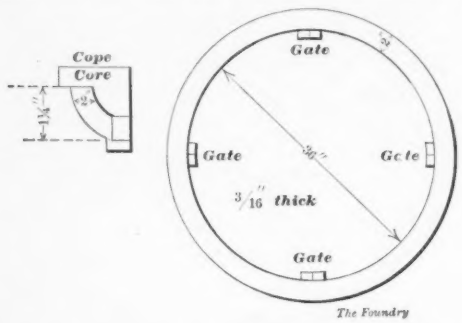
fired from the outside, where the coal is delivered direct from the cars, the object being to keep as much of the ashes and dirt, usually accumulating in this department, from entering the shop as possible. A common flue extends the entire length in front of the ovens, as shown in the illustration. Instead of using the common brick walls for the openings of the ovens a specially designed cast iron door lined with fire brick is provided, which not only saves brick, but also permits of a much more rapid opening and closing of the ovens. Opposite the annealing ovens is another set of tumbling barrels which clean the castings as these come from the ovens, when they pass to the grinding, assorting and packing room, 80 by 100 ft., from which they are loaded for shipment.

The plant of the American Malleable Casting Company has the appearance of having been furnished with every necessary appliance and facility for turning out good work economically, although there is a noted absence of the frills with which it is common to adorn new plants. It is proposed to build a belt line to connect the works with the Elgin, Joliet & Eastern Railway, or, as it is called, the Chicago Outer Belt Line, at Barrington, which will give better shipping facilities than could be obtained at congested points nearer Chicago. I. L. McCord is president of the company, H. C. Dolph, secretary, and H. C. Duggan, superintendent.

Casting Aluminum.

I would like to ask some of the readers of THE FOUNDRY who are acquainted with the casting of aluminum to give me a few pointers to overcome the trouble we are encountering through the shrinkage of this metal. All the aluminum castings we make are used principally for patterns. We have been trying to cast an oil-box wedge of this metal, but through shrinkage the metal draws away so that the crown of the wedge is not there.

We have also attempted to make the rim of a car wheel pattern of this metal, but find that a casting comes out in short pieces after it is cast. The sketch shows our plan of molding this casting. J. W. BROWN.



Wire-Wound Cast Iron Pipe.

At the Paris Exposition there were exhibited some cast iron pipes wound with steel wire for use under high pressure. Notwithstanding their higher cost the city of Lyons has not less than 8,000 meters of these pipes, one meter in diameter in use, and the city of Paris has laid 115,000 meters of this kind of pipe 1¼ meters in diameter. The pipes are made with grooves on which the wire is wound. They are cast vertically and tested to a pressure of 15 atmospheres. They are then tarred, wound with wire, which is heated just before being applied, and the pipes are then tested again.

The Allston Foundry Company is putting on the market a new cast iron pulley, the novelty of which lies in the insertion of several rows of 1-inch corks in its face. These are placed about 2½ inches apart on its circumference and are so distributed across the face of the pulley as to give a uniform bearing to the surface. These corks are forced into cored sockets less than one-half an inch deep and protrude slightly above the smooth face of the pulley. At the Worcester Polytechnic Institute Professor C. M. Allen made a test of the Allston pulley, the ordinary smooth face iron pulley, the wood, the wood with leather face, the paper, and the wood pulley with cork inserts, and found that the Allston pulley gives a greater and more uniform power transmitting service than any of the others.

A. E. FAY.

O'Neil's Gear Molding Machine.

Through the courtesy of the Fulton Iron Works of St. Louis, Mo., we are enabled to present some illustrations of a gear molding machine built from designs of Mr. J. F. O'Neil, superintendent of the works. Unlike most molding machines, this one was not constructed with a view of creating a demand for others of the same character, but to better enable its builders to take care of an increasing trade in machine molded gear wheels.

We believe everyone will concede that a ma-

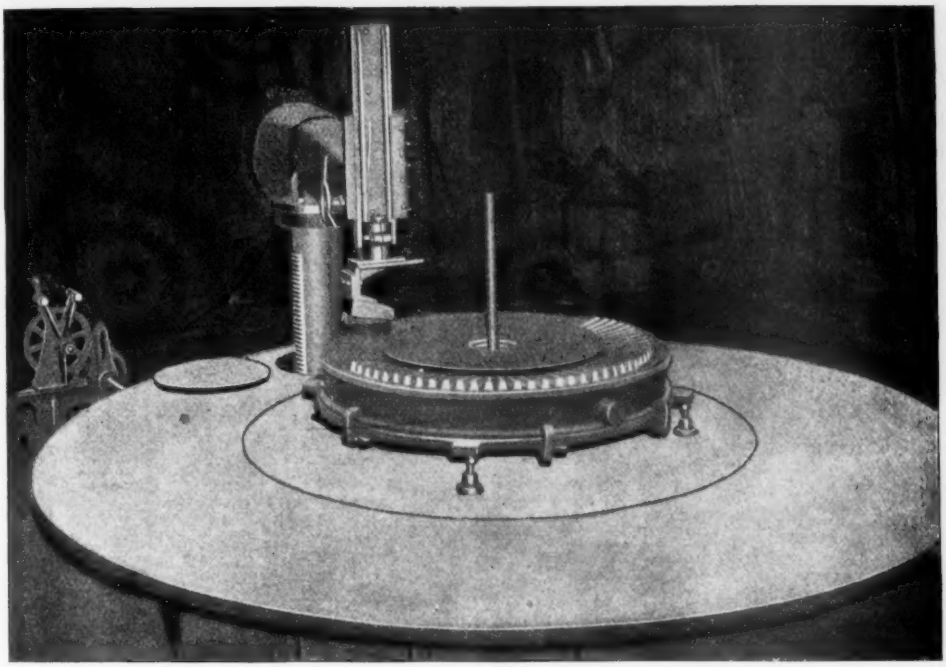


FIG. 1—O'NEIL'S GEAR MOLDING MACHINE. MOLDING A BEVEL GEAR. THE PATTERN BEING STATIONARY AND THE MOLD REVOLVING.

chine will make a better and more perfect gear wheel than it is possible to mold by hand. When it comes down to fine measurements hand molded gears will be found sadly lacking in uniformity, nor, could anything else be expected. The larger the gear to be made, the greater will be the variance in the finished casting, and it is therefore in the line of progress that machines should be called to the assistance of the founder.

As the half-tone illustrations show, all kinds of gears may be made on this machine, the base plate of which is made in two parts, the inner section being movable and the outer sta-

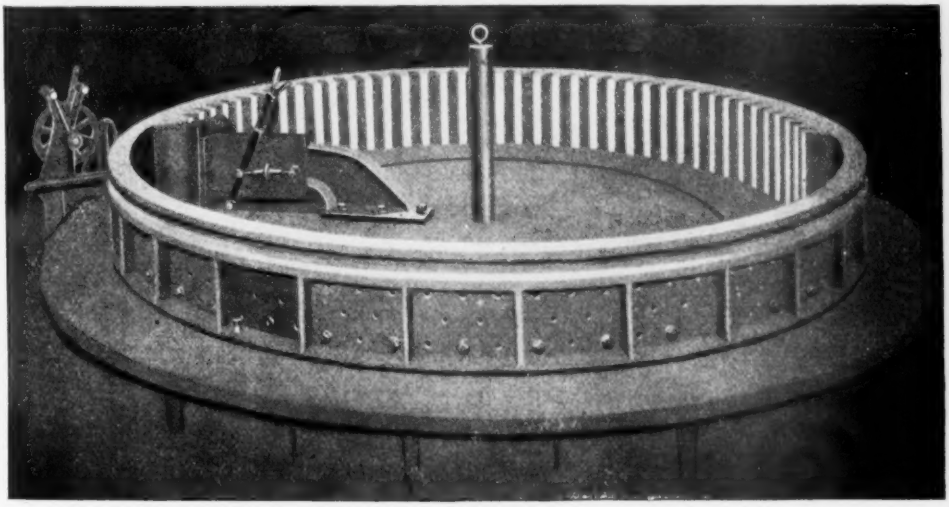


FIG. 2—O'NEIL'S GEAR MOLDING MACHINE. MOLDING A SPUR GEAR. PATTERN MOVEABLE, FLASK REMAINING STATIONARY.

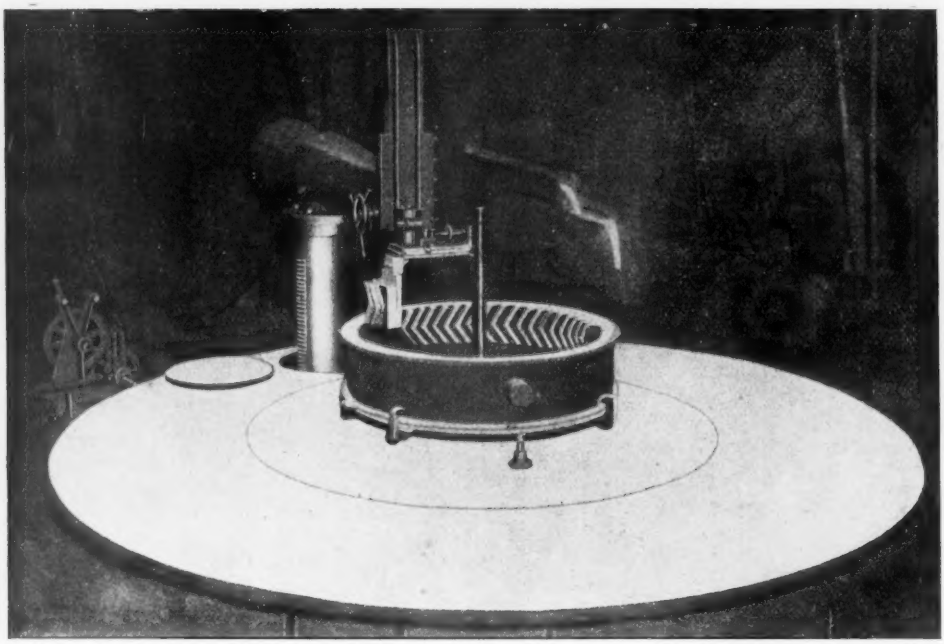


FIG. 3—MOLDING A V GEAR. PATTERN STATIONARY, FLASK REVOLVING.

tionary. In Fig. 1 a bevel gear is being molded, the flasks being small enough to permit of being placed on the revolving section of the base plate, the pattern being carried on an overhanging arm supported by a post, both of which may be adjusted to suit any face or diameter of wheel wanted. When once located the arm and post remain stationary, the pattern

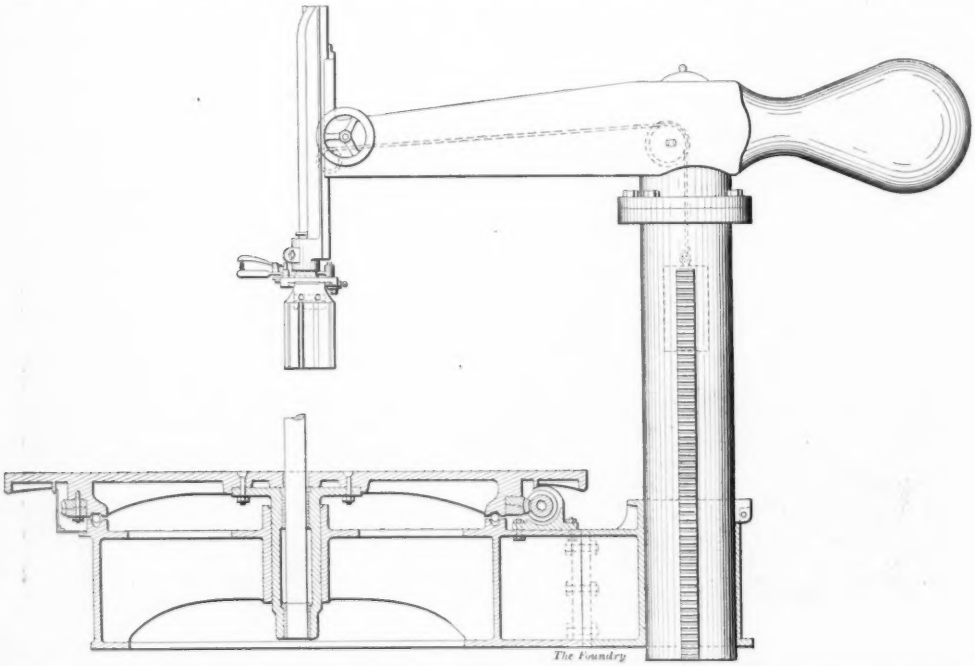


FIG. 4—METHOD OF SUPPORTING AND DRIVING THE INNER PLATE OF THE O'NEIL GEAR MOLDING MACHINE.

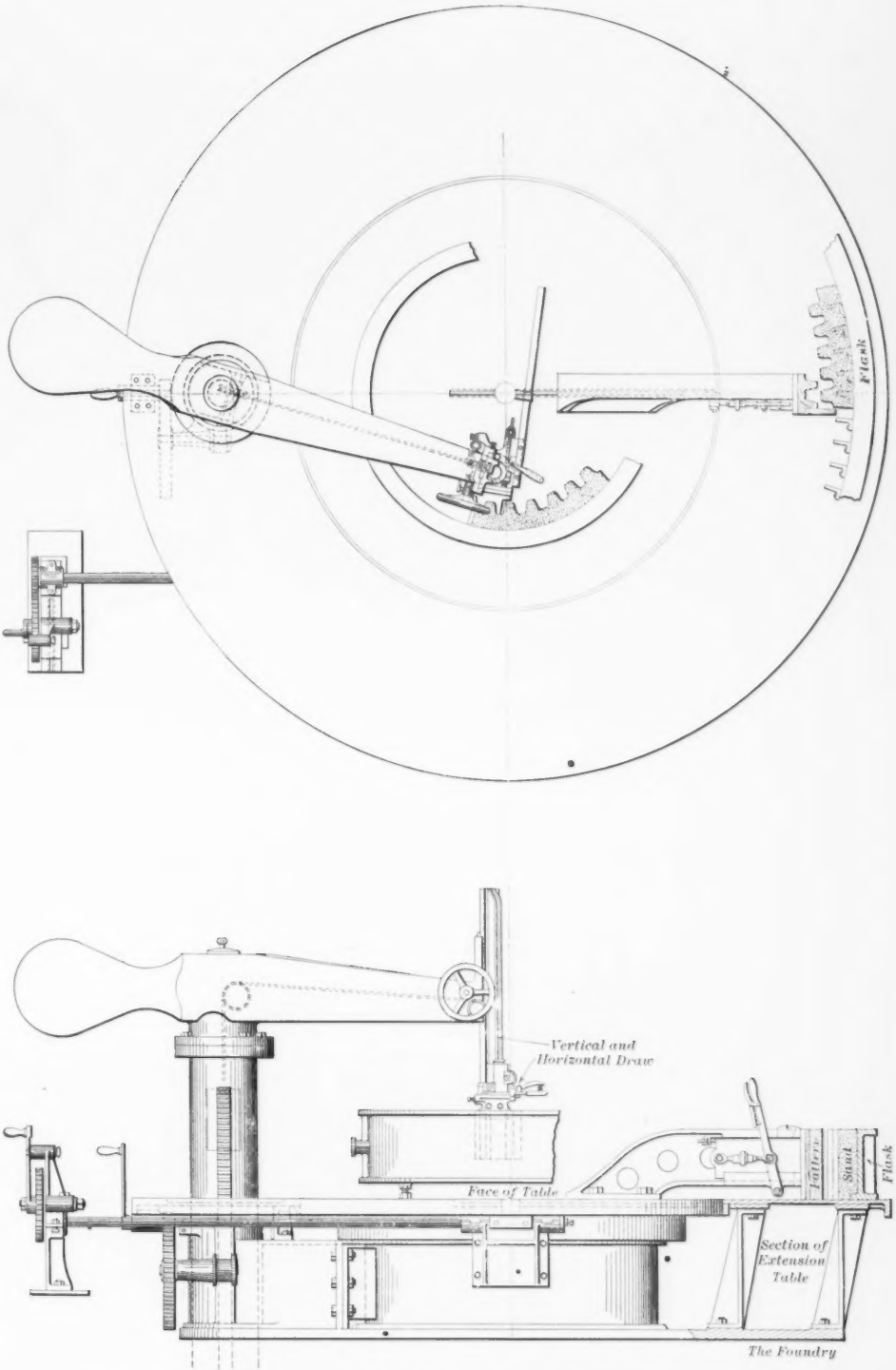


FIG. 5—PLAN AND ELEVATION OF THE O'NEIL GEAR MOLDING MACHINE, UNIVERSAL TYPE.

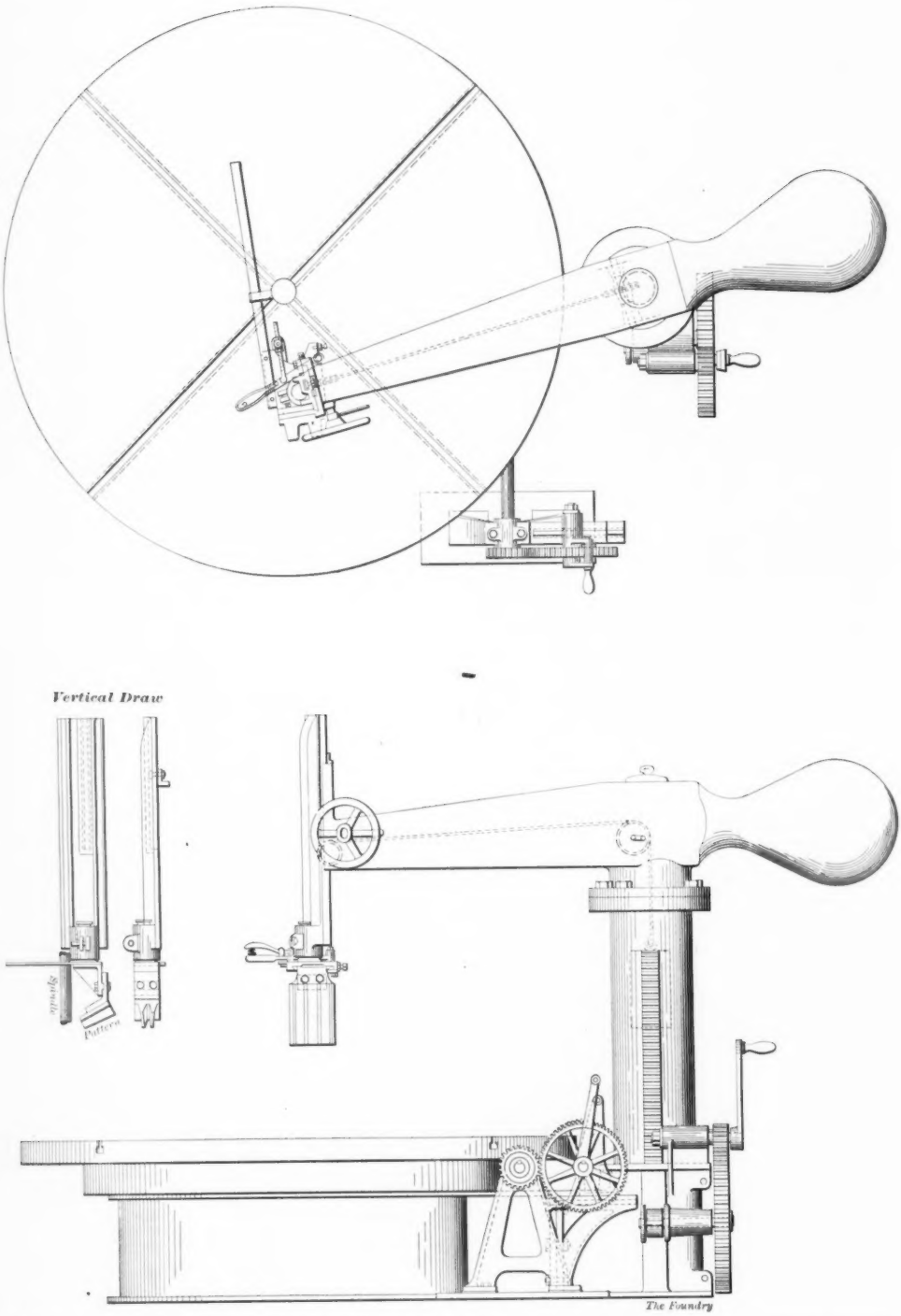
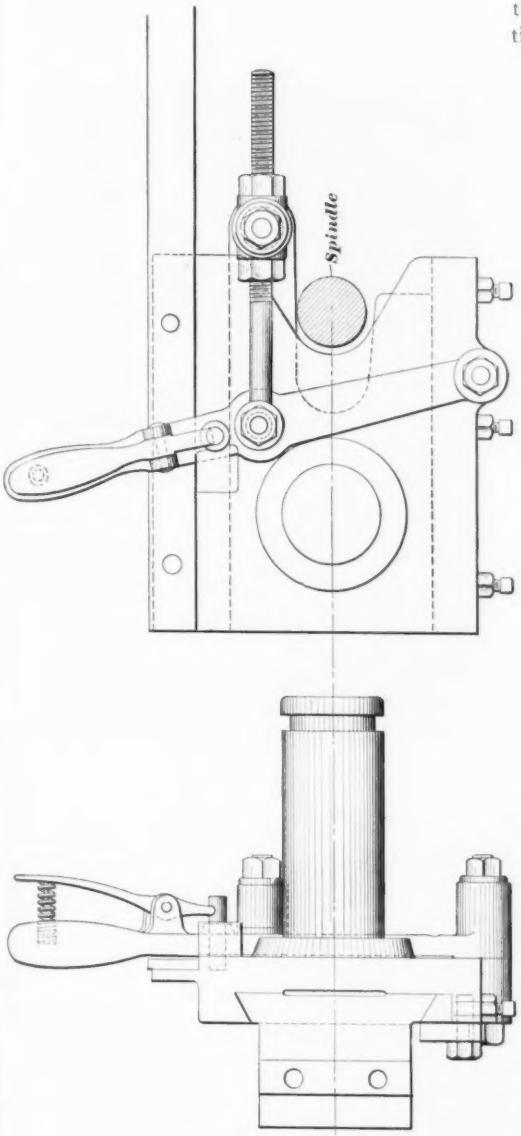


FIG. 6—PLAN AND ELEVATION OF THE O'NEIL GEAR MOLDING MACHINE, MEDIUM SIZE, SHOWING DETAIL OF VERTICAL DRAW.

being held by the slide at the inner side of the arm. An adjustable stop governs the slide in lowering the pattern to the same depth for each tooth. In this case the flask revolves and is moved to its proper place for each tooth by the change gear head and crank shown to the left in the illustration.



In Fig. 2 a large gear is being molded, and in order to accommodate the greater dimensions of the flask, the overhanging arm, which carried the pattern in Fig. 1, is removed and the hole through which it entered the base plate covered up, the flask thus being supported by the stationary section of the base plate. In this method the pattern is carried by an arm fastened to the inner section of the base-plate, the flask standing still, while the pattern is movable. The indexing is done as in Fig. 1.

It will be noticed from the illustrations of molding different styles of gear wheels that the pattern may be drawn in whichever direction it will best leave the mold. Fig. 3 gives another example of the wide range of this machine. Fig. 4 is a sectional view of the machine without the outer portion of the base-plate and shows how the inner section is supported and driven. It is mounted on ball bearings and moved by a worm wheel seen at the right. Fig. 5 is a plan and elevation of the complete machine, showing the two methods of molding wheels seen in the previous illustrations. Fig. 6 gives further details of the method adopted for drawing the pattern horizontally. Fig. 7 shows the design for withdrawing the pattern either vertically or horizontally.

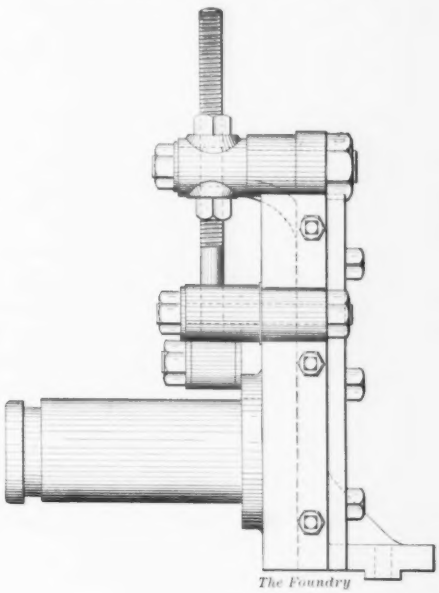


FIG. 7—PLAN AND END ELEVATIONS OF THE PATTERN CARRYING HEAD.

For the general run of gear wheels it is the accepted custom to use a three-part flask, the gear proper being molded in the cheek and generally dried. The arms may be formed either by dry sand cores or in green sand, the

former method prevailing. Not only does the Fulton Iron Works of St. Louis perform its own gear-molding with this machine, but considerable custom work for outside foundries, the latter furnishing simply the cheek portion of the flask, and then transfer this, when completed and dried, to their own shops, where the mold is finished and cast.

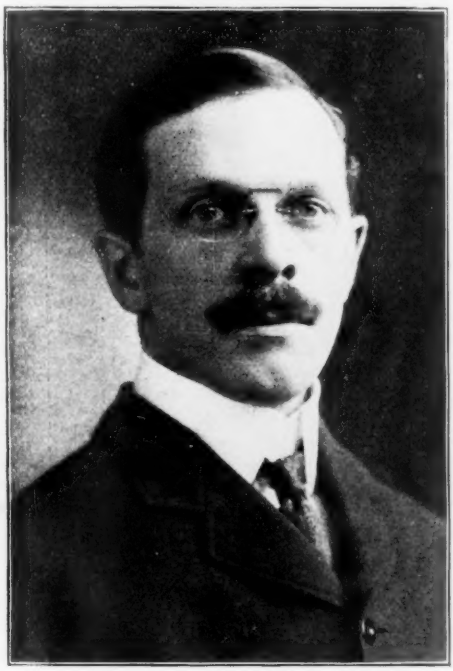
The New York Meeting of the National Founders' Association.

A number of interesting topics came up for discussion at the New York meeting of the National Founders' Association, and while unanimous approval was not given to all, yet it showed the active interest displayed by the association in matters affecting the foundry business.

Aside from questions which only interest members of the association, Mr. Hoyt, the retiring President, referred to the importance of securing foundry foremen thoroughly in accord with their employers and capable of managing shops even under difficult conditions. Mr. Hoyt referred to the fact that those members of the association who had received the greatest amount of co-operation from their foundry foremen during times of labor troubles, had had the greatest success in keeping their shops running. Mr. Hoyt also referred to the fact that the foundry foremen can do much toward the introduction of the molding machine and other improvements without friction, and that 'without the enlistment of his aid difficulties may be encountered.

It was the general concensus of opinion that agreements with core makers have not proven desirable. It seemed to be the general idea of those present that the core shop should rather be considered as a kindergarten for the foundry proper than as a separate trade whose members have no further aspiration.

To the question: Is the molding machine for a complicated class of machinery castings a profitable investment, and should it be operated by molders or laborers, some interesting replies were made. G. E. Emmons, of the General Electric Co., of Schenectady, N. Y., recited some of his experiences in this line. He stated that between sixty and seventy of the most modern types of molding machines are now in use in their foundries and that a considerable number of them are employed in turning out a class of castings which it has heretofore been thought impractical to make on molding machines on account of their complicated character. To the second part of the question the answers seemed to imply that for the plainer class of castings handymen have been found more profitable to employ than molders, but that where machines are used for the better class of castings, the molders obtained the best results. The association decided to establish the office of Commissioner, incorporating this with that of the Secretary.



W. D. SARGENT, PRESIDENT OF THE NATIONAL FOUNDERS' ASSOCIATION.

This is intended to relieve the President of the association from much of the executive work which has heretofore demanded his time. The election of officers resulted as follows:

President—W. D. Sargent, The Sargent Co., Chicago.

Vice-President—F. T. Towne, Yale & Towne Mfg. Co., Stamford, Conn.

Treasurer—John R. Russel, Russel Wheel & Foundry Co., Detroit, Mich.

Secretary—John A. Penton, Detroit.

During the meeting the retiring President, Mr. Hoyt, was presented with a magnificent sterling silver tea set, one of the elaborate sets exhibited at the Pan-American Exposition by the Gorham Mfg. Co. The Secretary, John A.

Penton, was also remembered in a similar manner with a chest of sterling silverware, also made by the Gorham Mfg. Co.

Wm. D. Sargent, the new President of the National Founders' Association, is President of The Sargent Co., with works at Chicago Heights, Ill., and is also at the head of a number of other concerns in the railway supply trade. He was born in Boston in 1864, and after leaving school secured part of his mechanical training with the Ramapo Wheel & Foundry Co., of Hilburn, N. Y., and the Pullman Co., of Chicago. Later he became superintendent of The Sargent Co.'s plant at Chicago, then manager and vice-president of the same concern, being elected president last June.

F. T. TOWNE, VICE-PRESIDENT OF THE NATIONAL FOUNDERS' ASSOCIATION.

F. T. Towne, the new Vice-President of the National Founders' Association, secured his business training with the Yale & Towne Co., of Stamford, Conn., and is at the present time superintendent of that company's plants at Stamford and Branford.

The Foundrymen and Their Molders.

The relation of the foundrymen and their molders during 1901 is dwelt upon in a review of that period appearing in the December issue of the *Iron Molders' Journal*, from which we reproduce the following:

"As the year 1901 began, the utterances of men from all walks of life upon the subject of conciliation and arbitration in labor disputes, were still ringing in our ears as a result of the Chicago convention of the National Civic Federation. At the same time our own Cleveland strike was being fought with undiminished vigor. It had reached its seventh month with little apparent prospects of settlement. But little straws began to blow in a direction that indicated a mutual desire for adjustment, and after some preliminary correspondence between President Fox and President Hoyt of the N. F. A., a joint conference was held in Cleveland from Feb. 7 to Feb. 15, which resulted in an agreement under which the Detroit resolutions—the chief cause of the strike—ceased to be in operation in the Cleveland foundries, the foundrymen agreed to discharge all the non-union men within forty days, and, as soon as a shop was rid of them, to fill it with union men, the wages to remain at the $2.75 rate. These were the salient features of the settlement.

"Within the specified time all the shops but three—Lorain Foundry Co., Otis Steel Co. and Variety Iron Works Co.—had complied with the terms of the agreement. These three shops have still failed to fulfil their manifest obligation, and are, therefore, closed to union men. The officers of the N. F. A. are emphatic in their expressions of disapproval of their course, but the prominence given to at least two of these recalcitrants at the late convention of the N. F. A. is such as to shake our faith in the sincerity of these protestations.

"On March 27 the annual conference was held with representatives of the Stove Founders' National Defense Association in Chicago, to consider their request of a reduction in molding prices and the ratio of apprentices. Agreement was reached by which the wage rate remained the same, and a proposition looking to the change of our apprentice ratio from that of one apprentice to eight journeymen, to one apprentice to five journeymen, was to be submitted to a referendum vote of the membership. That vote is now being taken, and, whatever may be the result, the discussion which has been conducted upon this very important subject, should be of great educational value and assist us in establishing an equitable ratio of apprentices even though in doing so we run afoul of our prejudices.

"As spring advanced the wage rates in several localities began to demand attention. About the first in the field was No. 244, Detroit, with a demand for $3 per day minimum for floor molders, then followed St. Louis, Chicago and Milwaukee, with similar demands. As the Cleveland wage rate, by the terms of the February agreement, was to be considered early in June, a disposition was shown in other localities to postpone final action until a conference had pronounced upon the Cleveland case.

"Meanwhile, the strike of the machinists for the nine-hour workday was inaugurated on May 20. All over the country machine shops were temporarily deserted. Machinists, handymen and laborers took part in the movement, for a time paralyzing the industry. In a few places the molders, notably on the Pacific Coast, also became involved, although warned against allowing themselves to be involved in a movement which depended upon enthusiasm to win against a powerful association of employers. When the June conference on the Cleveland wage rate was held the machinists' strike was at its height, and, though Cleveland machine shops were not involved to any great extent, the foundry industry in so many localities was injuriously affected, the outlook was so uncertain because of further threatened complications with the steel workers, that no decision was reached upon the demand of No. 218 for an advance of 25 cents per day, and under the circumstances the board did not deem it advisable to force the issue.

"The situation, it will thus be seen, was a critical one. The Chicago molders who had demanded an advance of 25 cents per day in the minimum of floor molders and 50 cents per day for bench molders, thus establishing a straight minimum of $3 per day, had refused a compromise of $2.75 per day for bench and floor molders made by the Chicago foundrymen, and were urgent in the desire that they be permitted to strike for their original demands. Other localities were equally urgent, the immediate future of trade conditions was shrouded in uncertainty because of the complications above referred to, and the fact that in many localities our members were either idle or on short time because of them. It was, therefore, decided to call a meeting of the executive board at which representatives of the disturbed localities should be present to confer. The meeting was held on June 24, and it was decided to take up the Chicago case first. On July 1 and 2 the conference with representatives of the N. F. A. was held and adjourned with two propositions of the representatives of the union pending. These were subsequently rejected, and an offer of $2.85 minimum to floor molders and $2.65 to bench molders was made, with the understanding that the same advance would be given in the other centers where wage demands were pending. The board had already pronounced themselves as in favor of devoting attention to the low-priced districts, which were a constant menace to the wages of the better organized centers, and thus fortifying the position of the latter rather than of pursuing a policy which might involve the organization in a strike that would monopolize its resources for a time, in order to secure a further advance for a large center, if a reasonable compromise could be peacefully effected. Consistent with this policy and with due appreciation of the situation as herein outlined, the board instructed the national officers to accept the foundrymen's proposition. The Chicago conference board had served notice that unless the executive board agreed to support them in their demands they would strike independently. It was thought calmer judgment and a realization of the situation would prevent such extreme measures, but this proved incorrect, and on July 5 the Chicago strike was inaugurated, the members of No. 153, Harvey, Ill., one of the locals in the Chicago conference board, refusing to take part and accepting the executive board's decision.

"This is in brief what preceded the Chicago strike. Fortunately for our members, the machinists' strike collapsed towards the beginning of August and trade immediately began to pick up all over the country. A good measure of success has attended their efforts. They put up a good fight, but according to advices from Chicago there yet remain about 20 shops that are resisting their efforts. In the final computation we still feel that obedience to the decision of the executive board will again be demonstrated as being the wisest policy in such an emergency.

"The Eastern districts of Pennsylvania have long been known to the machinery branch of the trade as low-wage districts. From the New York and Philadelphia districts, where a higher wage rate has been maintained, constant complaints have been heard about competition with the large number of small foundry towns which dot Eastern Pennsylvania.

York, Pa., where No. 33 holds sway, is recognized as the center of this community, and there it was determined to make an effort to establish some kind of minimum. Accordingly a demand for $2.25 per day was made. Four shops became involved, and since early in May the fight has been continued. The foundrymen of York are not members of the N. F. A., so that they could not be reached through that association and a strike was the only recourse. The machinists were also involved at the beginning of the fight, but they soon dropped out and returned to work. The employers thus encouraged renewed their efforts to defeat our members, but finding them staunch and determined, finally invoked the aid of the law and secured from Judge Stewart one of the most sweeping injunctions of the year. For violating some of its terms Bros. Frey, Fourth Vice-President, and Test, Corresponding Representative of No. 33, were thrown into jail after a farcical trial, and only liberated upon the payment of a heavy fine on their behalf by the I. M. U. This demonstration, however, failed of its purpose, and the molders are fighting yet. Although the original purpose of this struggle is not yet attained, its moral effect in the district has been most marked and wages have sensibly advanced and conditions been bettered. The result of a strike cannot always be computed by its effect in the locality immediately affected.

"Altogether the year has been a very successful one for the Iron Molders' Union. The general trade activity has been reflected in its progress during the year. Let us hope it has built to endure."

Philadelphia Foundrymen's Association.

At the December meeting of this association the first business taken up was the question of the incorporation of the association under the laws of the State of Pennsylvania. After discussion of the details attending such a course, the matter was referred to the next meeting, P. D. Wanner in the meantime offering to present the necessary information in regard to the procedure and cost, so that the association could act finally in the matter.

The Treasurer, Josiah Thompson, reported a good balance in the treasury, and all bills paid.

In the invitation issued for the meeting a discussion was suggested as to the existing supply of loam and dry sand molders. In introducing the subject, Secretary Evans said that he had received a number of communications from founders in various sections, all tending to show that a good demand existed at the present time for good loam molders. The subject not being deemed one suitable for consideration by the association as a body, it was not discussed further.

Election of new members was next in order, and H. L. Haldeman, President of the Pulaski Iron Co., Philadelphia, was elected. Secretary Evans read a communication from the McKinley Memorial Association, soliciting the co-operation and active interest of the foundrymen in the national memorial to the late President which it was proposed to erect in Canton, O. After a short discussion, which pretty clearly showed the general desire of the members of the association to make a donation to the memorial fund, a motion was passed donating the sum of $50 from the funds of the organization.

H. O. Evans then read a paper, by J. G. Sadlier, of the Springfield Foundry Co., Springfield, O., and President of the American Foundrymen's Association, entitled

"HEAT TREATMENT OF CAST IRON."

Combustion plays a most important part in the history of all metals, as without heat it is impossible to produce or use them. The ores of iron, as they are mined, vary much in appearance, some being hard and rocky, and others again resembling different colored clays. These ores, when charged with a sufficient amount of limestone and coke or charcoal, are reduced to metallic iron. Usually there are several varieties of ores used by the furnaceman to produce the grades of iron desired for the different requirements. The chemical constitution of the respective ores enables the furnaceman to do this.

It is held that iron would be all of the same character if the impurities could be removed from it. I do not believe that this is true. There are to my mind as great differences between the irons produced from different ores as there are differences between the timbers growing in the woods. Some woods show great strength and elasticity, while others are very brittle; some varieties are very soft, while others are very hard.

It is true that the elements entering into the composition of cast iron play a most important part, yet the irons showing the same composition will not always, under the same circum-

stances, show the same physical characteristics. As the physical qualities are the ones which make cast iron valuable for mechanical purposes, too much care cannot be taken at the blast furnace to get the right ores and the right compositions of the resulting pig irons. With the proper care thus exercised, and a good furnace in proper working order, there need be no doubt as to the quality of the resulting iron.

The iron is now ready for the second process. It goes to the converter for Bessemerizing into steel, or into the air or open-hearth furnace, or into the cupola. In the case of the "malleable" or "steel" furnaces, heated as they are up to the melting point of the metal which is charged cold, it is interesting to note how the iron greedily absorbs the heat, as a sponge takes up water. The crystals begin to separate, and finally the whole mass sinks together, a wonderful change from a solid, hard substance to a fluid molten mass.

Now, as there is much gas absorbed by the melted bath of iron from the waste products of combustion, and again much of this remains in the iron when solidifying, it is highly important to have the combustion in the furnace just right. Thus, if there is too much air introduced into the furnace, in proportion to the fuel used, some of this results in an oxidation and consequent hardening of the metal. Then again, if there is too much fuel for the amount of air, the result is equally bad, as carbonic oxide is formed, which is also absorbed, forming the blow holes so often seen in castings of steel and iron.

Now, what is true in the furnace also holds good in the cupola, so far as charging too little coke and putting on too much blast is concerned. Iron melted under these conditions, when first tapped, may show up very hot; yet when conveyed to the mold in hand ladles, chills very rapidly, and in the smaller castings, or light sections of the heavier ones, there will be found under the skin a lot of blow holes. If too much coke is charged the melting zone is raised in the cupola, and the melted iron running down through the thick bed is too long in contact with the blast. The consequence is a species of converter action which is highly undesirable. Too much care cannot be taken to charge the proper amount of coke best suited to the blast.

A pressure indicator on the blast pipe is not a reliable guide, for if the material charged is fine, it is apt to obstruct the passage of the air and show an apparently high pressure. The best guide, therefore, is to carefully observe the melted iron as it runs from the spout, which to the carefully trained, experienced man, shows what is going on within, just as though he were looking into a stream of clear or muddy water. In the latter case he would soon know there was something wrong.

The iron as it runs out will contain much absorbed gas which escapes at the point of set. If you were to cool suddenly the ladle of metal as it stands at the cupola, if the iron were of the chilling variety, the entire mass would become one chill. From this sudden chilling to keeping the iron fluid as long as possible before it sets, and then letting it cool off gradually, there is an effect on the fracture to be observed which is of great interest. In the first case there will be no appearance of crystals, while in the last large flakes may be observed with the structure very open and porous. In all sections of castings, according to their thickness, from one-eighth of an inch to twelve inches, you will find a closing of the grain gradually towards the lighter section.

From the foregoing it will be seen that the bringing out of two points is aimed at. First, that the same mixture of iron, melted under the different atmospheric and heat conditions which may prevail at the time, will not produce the same grade of iron in the castings. Second, melted iron poured into a large ladle where it may become thoroughly mixed, will not produce the same grade of castings, if poured against a chill, in a small section or in a large section. In the first case the absorption of gases will vary, and the constituency of the melted mass is variable. In the second the sudden chilling locks up all the occluded gases in the small sections, while allowing most of them to escape in the larger, slower cooling ones. The consequence will be the formation of the gas pockets above mentioned. Melted iron coming in contact with anything which would cause agitation, such as moisture from overly damp sand, or the pouring into hard molds, shows the same characteristics.

The conclusion therefore is that to obtain a certain character of iron in a casting, reliance must not be placed entirely upon the nature of the iron charged into the cupola; but the atmospheric conditions, coke, blast and character of casting to be made are also important factors; a most important one being the getting of a proper combustion.

DISCUSSION.

Mr. Wanner—The paper does not give us very much information. Every man who runs a cupola should be, in a measure, very closely related to the cupola or the two cannot get along together.

Mr. Moore—I wish the gentleman who wrote the paper was here. We are told in such papers very generally what not to do, but we get no information as to what to do. We all know we get hard iron and other troubles, but are not told how they can be remedied. In our own plant we have found much good resulting from the use of a blast gauge on a cupola, and we do not have as much trouble as we used to. It is necessary for the men around a cupola to be fully in touch with everything. If any man can formulate a rule whereby he can melt iron in any cupola he could make lots of money.

Mr. Wanner—Years ago, when I first became connected with the business, it was an ordinary thing to lose a heat now and then, but of late years we have not had such experiences. A mistake is made perhaps, now and then, and results are not always uniform, although perhaps not far away from the mark. Such a thing as dropping the bottom and losing a whole heat does not happen any more.

H. O. Evans—I think the writer of the paper makes the point that the air supply must be controlled. When the gauge on a cupola runs up to 22 it means a "blowing up" for the cupola man every time. I have always found that the higher the blast the higher the melting zone.

Mr. Moore—I have found some peculiar things in melting. We have one cupola on which is carried a pressure of 16 inches of water, and if that gets reduced we do not get good results. Now, we have another cupola on which we only carry 10 inches. The blower is driven by an independent engine and the speed can be regulated to carry the water in the gauge at any pressure that seems fit. The engineer ascertains which cupola is to be run and how much iron is to be melted and gets the pressure he considers proper for the melting.

Mr. Devlin—I do not see what the paper proves. I am a firm believer in chemistry and consider it very effective.

H. O. Evans—It would seem that all the points accounted for might come in the heat treatment of the iron.

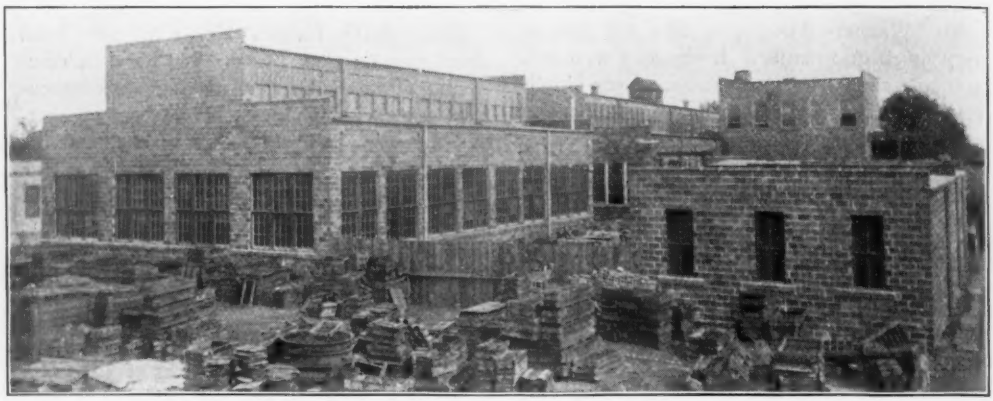
Good Furnace Record at a Steel Casting Plant.

Open-hearth furnace No. 2 of the Solid Steel Casting Co., Chester, Pa., has just completed a remarkable run, making 490 consecutive heats without any stop for repairs. During this campaign some 12,250,000 pounds of steel castings were made. Considering the delays which are attendant on the operation of a furnace at a steel casting plant, this performance is phenomenal. The furnace is of Herrick design, 15 tons capacity, and is supplied with two improved gas producers.

The Rogers Locomotive Works of Paterson, N. J., has been reorganized by its late purchasers under the name of the Rogers Locomotive Co. Officers were elected as follows: John Havron, president; E. H. Norton, vice-president; F. P. Holoran, treasurer; G. E. Hannah, secretary; Reuben Wells, general manager, and Hon. John W. Griggs, counsel. The directors are Sir William C. Van Horn, G. B. Hopkins, George Turnue, J. D. Probst, E. C. Smith, F. P. Holoran, John W. Griggs, R. C. Purin, E. H. Norton, John Havron and Stephen Peabody.

The Simpson Stove & Mfg. Co., of Pittsburg, has decided to build a stove foundry at Canonsburg, Pa. The firm has been located in Pittsburg for eleven years, manufacturing gas ranges, heating stoves and gas-burning appliances, but has hitherto not operated its own foundry. A complete line of steel ranges will be added to the company's product when the Canonsburg plant is ready for operation, which will be next spring.

Henry S. Pickands, the senior member of the firm of Pickands, Brown & Co., Chicago, died at his home in that city December 17. He was 68 years old, a native of Akron, O., and for some years a resident of Cleveland. He was a veteran of the Civil war with the rank of major. In 1873 he went to the Lake Superior region and assumed the management of the old Bay Furnace Co., manufacturing charcoal iron, and afterwards operated furnaces in Ohio and at Fruitport, Mich. The firm of Pickands, Brown & Co. was organized by him in 1855. Maj. Pickands had considerable interests in Lake Superior mining properties, particularly in the Minnesota and Chandler. He has been for years one of the foremost figures in the Chicago iron trade.



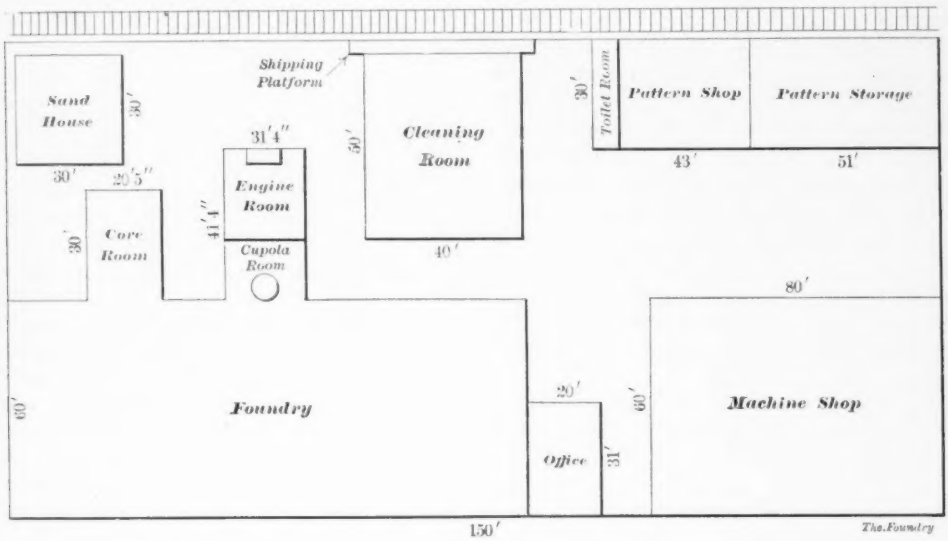
A REAR VIEW OF THE PLANT OF THE MAYWOOD FOUNDRY & MACHINE CO.

Plant of the Maywood Foundry & Machine Co.

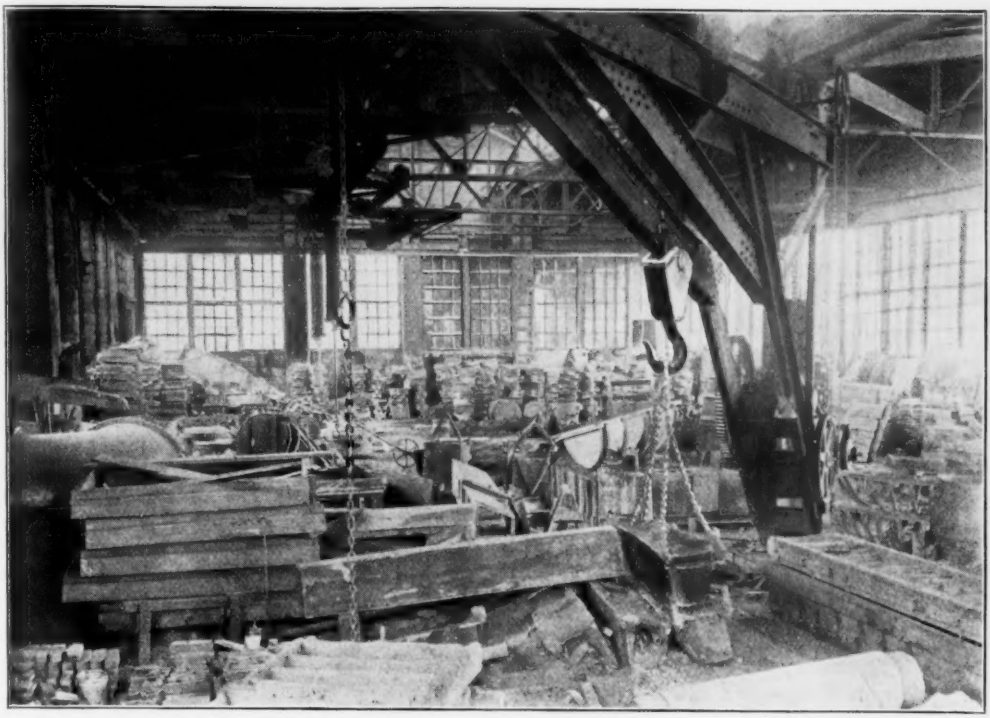
Situated at Maywood, one of Chicago's suburbs, is the plant of the Maywood Foundry & Machine Co., well known as the builders of the Maywood molding machine and the Maywood gas engine. The works are located on the line of the Chicago & Northwestern Railroad, and have every facility for receiving and dispatching material. The plan of the works will give some idea of their size and the way they are laid out. All the buildings are constructed of vitrified salt-glazed hollow building blocks, which have the advantage over ordinary brick in that they are impervious to moisture and practically non-conductors of heat.

The foundry is the largest building of the group, measuring 60x150 feet. The weight of the steel roof trusses is supported by steel columns instead of the walls, and no posts obstruct the interior. It is well supplied with windows and the roof has a lantern extending down its center, which is 30 feet wide and 8 feet high, giving a better chance for thorough ventilation.

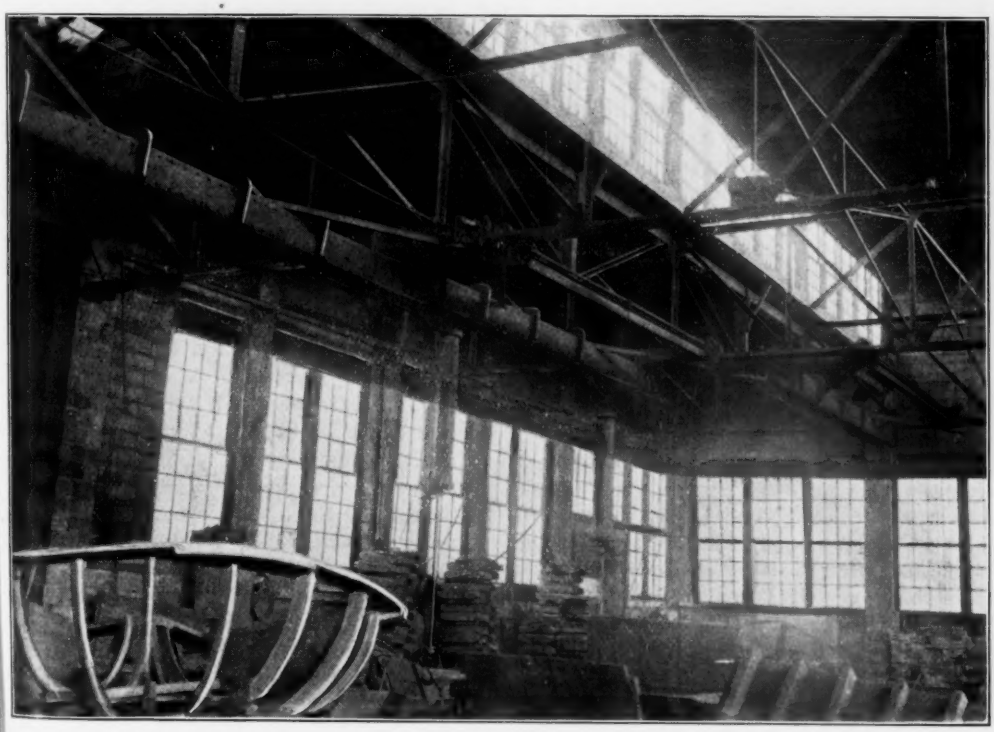
The roof trusses are arranged with a track on the lower chord of the truss for traveling trolleys. These tracks traverse the shop crossways instead of lengthways, but are so arranged that they may be connected together automatically at any point and every part of the building reached. As arranged at this plant each section is for all practical purposes



PLAN OF THE WORKS OF THE MAYWOOD FOUNDRY & MACHINE CO.



INTERIOR VIEW, MAYWOOD FOUNDRY & MACHINE CO'S. FOUNDRY.



SYSTEM OF INDEPENDENT TROLLEY TRACKS, MAYWOOD FOUNDRY & MACHINE CO.

FILLING ROOM FOR BRAKE SHOES, MAYWOOD FOUNDRY & MACHINE CO.

an independent traveling crane, the trolley track permitting of movement lengthways of the shop, while the bridge which supports the trolley track gives the necessary movement in other directions. Yet, as here arranged, all advantages of a continuous trolley track throughout the length of the shop may be realized by moving the trolley tracks to such a position that they are in line when they are automatically locked in position, and an air hoist carrying a load may travel from one end of the shop to the other.

Our illustration shows two of the trolley tracks in line, both air hoists being transferred to the middle section. These cranes are all equipped with roller bearings and the trolleys have 8-wheel trucks which enable an opening in the track to be covered without any jar. The equipment for melting includes a No. 6 Whiting cupola.

The entire power for this plant is obtained from two Maywood gas engines, which furnish power to run two dynamos, an air compressor, blower, elevator and pump. The cleaning room, 40x50 feet in size, is equipped with a 10-horsepower electric motor and a number of tumbling barrels. A portion of this building forms a foundry store room, containing supplies of all kinds and tools for the foundry. Each molder is provided with a set of individual tools and is held responsible therefor, and anything special may be obtained from the storekeeper. Beside making the castings which are necessary for their own use the capacity of the foundry is large enough to take care of considerable outside work. This includes considerable quantities of railroad castings, locomotive cylinders are also made. A couple of floors in the foundry are set aside for the molding of brake shoes, these being molded on Maywood machines. One of our illustrations shows the filling room where one of the styles of brake shoes after it leaves the foundry is filled with a special compound under a heavy pressure, which adds longer life and greater brake power to the shoe than if it was made of cast iron only.

The plant of the Maywood Foundry & Machine Co. was designed by M. J. Morehouse, Chicago, assisted by O. H. Davison, superintendent of the works. F. E. Lonas is president of the company.

Thomas Devlin & Son, Philadelphia, Pa., manufacturers of malleable iron fittings, castings, etc., are negotiating with the local improvement association of Burlington, N. J., for the removal of their plant to that place. Though nothing definite has as yet been decided, there is a possibility that Burlington will get the works, as the firm is at present very much in need of more room.

Melting Loss in Cupolas.

Some time ago Richard Moldenke, secretary of the American Foundrymen's Association, made inquiries in regard to the loss of iron in melting in cupolas, and from replies received the tables shown herewith have been compiled. Referring thereto he says:

"It will be remembered that the following information was asked for: The class of work and usual tonnage. Time from 'blast on' to 'drop bottom,' with blast pressure from fan or blower. The kind of fuel used, also pig iron, whether charcoal or coke, and the percentage of Southern brands. The kind of scrap bought. Then the weights of pig iron and scrap charged, and castings and scrap made. The last named items were necessary to figure the melting losses, and the other material to interpret the results intelligently.

"Of the many replies, which came even from Europe, only 41 could be used, as the information was not definite enough; others again had their material from the cupola equal to that going in, which manifestly indicates overzealousness on the part of the weighers. Only the best records seem to have been sent in, as

TABLE I—GENERAL JOBBING.

	NUMBERS.				
	1	2	3	4	5
Usual Tonnage	10	3	3	3	20
Time of Melting: hours, minutes	1' 15"	1' 00"	1' 15"	2' 0"	
Blast pressure, oz.	8			8	8
Fan or Blower	F	F	F	B	F
Pig Iron	Coke	Coke	Coke	Coke	
% Southern	None		None	None	
Fuel used	Coke	Coke	Coke	Coke	
Scrap bought	Mach.	Med. Mach.	Mach.	Stove.	Mach.
Pig Iron used, lbs.	10,400	3,200	2,657	2,685	26,000
Scrap used	9,600	3,200	2,886	3,885	20,000
Castings used	16,000	5,504	3,916	4,057	35,200
Scrap made	1,352	620	872	1,873	2,200
% Melting loss	10.7	4.3	13.6	9.7	6.5

Note—No. 3 is average of 10 heats.

TABLE II—LIGHT JOBBING.

	NUMBERS.			
	6	7	8	9
Usual Tonnage	72	6	16	2.5
Time of Melting: hours, minutes	3' 30"	1' 30"	2' 30"	1' 00"
Blast pressure, oz.	13	6.5		
Fan or Blower	B	F	F	F
Pig Iron	Coke	Coke	Coke	Coke
% Southern	None		None	None
Fuel used	Coke	Coke & Coal	Coke	Coke
Scrap bought		Stove	Lt. Mach.	Med. Mach.
Pig Iron used, lbs.	102,000	4,500	19,200	3,200
Scrap used	42,000	7,500	12,800	1,800
Castings made	108,300	10,300	21,000	4,000
Scrap made	27,500	1,200	9,100	800
% Melting loss	5.7	4.2	6.0	4.0

TABLE III—LIGHT MACHINERY.

	NUMBERS.					
	10	11	12	13	14	15
Usual Tonnage	10	6	3.5	5	15	40
Time of Melting: hours, minutes	1' 10"	2' 0"	1' 30"	1' 30"	2' 00"	6' 40"
Blast pressure, oz.			7	5	7	
Fan or Blower	F	F	B	F	B	F
Pig Iron	Coke	Coke & C'l	Coke	Coke	Coke	Coke
% Southern			None	50	35	50
Fuel used	Coke & C'l	Coke	Coke	Coke & Coal	Coke	Coke
Scrap bought	None	Med. Mach.	Lt. Mach.	Med. Mach.	Lt. Mach.	Stove
Pig Iron used, lbs.	16,000	6,000	3,900	4,500	14,000	56,000
Scrap used	4,000	6,000	2,750	4,280	16,000	24,000
Castings made	13,220	10,000	3,738	7,640	20,500	60,000
Scrap made	4,520	800	2,762	800	6,000	16,000
% Melting loss	6.5	9.2	2.3	3.9	11.6	5.0

TABLE IV—HEAVY MACHINERY.

	NUMBERS.			
	16	17	18	19
Usual Tonnage..	13	15	21	15
Time of Melting; hours, minutes	2' 0"	2' 00'	4' 00"	2' 00"
Blast pressure, oz.	6	10	9	14
Fan or Blower	B	B	B	B
Pig Iron	Coke	Coke	Coke & C'h	Coke
% Southern..	50	70	17	20
Fuel used	Coke	Coke	Coke	Coke
Scrap bought..	Mach.	Heavy Mach.	Mach.	
Pig Iron used, lbs.	14,720	20,000	25,740	15,500
Scrap used	11,130	10,000	16,270	11,500
Castings made	18,845	21,300	32,760	19,000
Scrap made	4,870	7,200	7,560	6,000
% Melting loss	8.4	5.0	4.0	7.4

TABLE V—STOVE PLATE.

	NUMBERS.		
	20	21	22
Usual Tonnage	20	15	10
Time of Melt., hrs. min	2' 15"	1' 30"	
Blast pressure, oz	14	11	13
Fan or Blower	B		B
Pig Iron	Coke	Coke	Coke
% Southern..	100	50	25
Fuel used	C'k & C'l	Coke	C'k & C'l
Scrap bought	Stove	Stove	
Pig iron used, lbs.	20,000	18,000	11,863
Scrap used	20,000	12,000	7,906
Castings made	24,000	20,192	11.750
Scrap made	14,200	9,000	7,629
% Melting loss	4.5	2.7	2.0

Note—No. 22 is average of 5 heats.

surprisingly low losses are to be chronicled in many cases. Nevertheless, apart from possible errors in weighing, the records are certainly valuable, as it is perfectly possible to melt clean iron and scrap with melting losses running below 5 per cent. In fact, your secretary has individual knowledge of one of the heaviest producers of car wheels in the country, taking their stock books all the year round, where the actual melting loss is less than 2 per cent. Here we see the value of clean, unoxidized irons, scrap which is not rusty, and a well constructed cupola in good working order. The information received was

TABLE VI—SANITARY WARE.

	NUMBERS.							
	23	24	25	26	27	28	29	30
Usual Tonnage	12	22	38	16	25	26	40	23
Time of Heat: hrs., mins	2' 00"	3' 15"	3' 15"	2' 30"	3' 45"	3' 45"	3' 45"	3' 00"
Blast pressure, oz.	5	14	14	5	14		5	
Fan or Blower	F	B	B	F	B	B	F	B
Pig Iron	Coke	Coke	Coke	Coke	Coke	Coke	Coke	Coke
% Southern	None		60				None	
Fuel used	Coke & C'l	Coke	Coke	Coke & C'l	Coke	Coke	Coke & C'l	Coke
Scrap bought	Medium		None	Med. Mach.	None		Medium	None
Pig Iron used, lbs.	11,800	51,000	56,000	9,875	31,470	33,000	35,560	29,000
Scrap used	12,200	12,000	20,000	22,625	17,760	19,850	47,210	17,500
Castings made	17,228	46,660	51,614	23,276	35,956	37,250	59,400	33,385
Scrap made	6,048	12,234	18,386	8,055	11,270	11,300	21,960	11,500
% Melting loss	3.0	6.5	7.9	3.6	4.1	8.0	1.7	3.5

TABLE VII—AGRICULTURAL.

	NUMBERS.				
	31	32	33	34	35
Usual Tonnage	80	45	41	9	9.5
Time Heat, hours, minutes	4' 20"	3' 15"	3' 30"	2' 00"	1' 20"
Blast pressure, oz.	16	12	13	12	9
Fan or Blower	B	B	B	B	B
Pig Iron	Coke	Coke	Coke	Coke	Coke
% Southern	50		50	50	None
Fuel used	Coke	Coke	Coke	Coke & Coal	Coke & Coal
Scrap bought	Agricul. No. 1	Agricul. No. 1	Med. Mach.	Stove	Stove
Pig Iron used, lbs.	80,000	45,000	45,700	7,071	7,500
Scrap used	80,000	45,000	35,800	10,674	11,600
Castings made	108,800	61,200	62,960	11,845	7,450
Scrap made	42,700	24,300	15,600	5,200	10,650
% Melting loss	5.3	5.0	3.6	4.0	5.3

tabulated in such a way that the interested fonuder can turn at once to the results he wants most.

"Nos. 2 and 3 seem to represent the extremes in this table, and strange to say, in each case about half pig and half scrap is in the mixture. It is possible that the diameter of the cupola may give a clue to the great difference, or yet the scrap in No. 3 may be very dirty. The table is a good representation of the general jobbing trade, a small, medium, and heavy tonnage being shown.

"No. 6 is an example of heavy tonnage, and No. 9, on the other hand, of a very light one. The results are all good.

"In table 3 we have a record of Southern iron used. The point was raised by one foundryman that whenever he used Southern irons the melting loss was increased by about 1 per cent. Nos. 13 and 15 do not seem to bear this out, and very probably the experience above mentioned may be traced to the use of Southern iron high in silicon. These would offer plenty of material to burn out. Possibly No. 14 is an example of this kind. Where coke and coal are given as the fuels used, the practice varies from an anthracite bed with subsequent charges of coke, to practically all anthracite, or at least only enough coke to effect a noticeable separation of the successive charges. Now and then we find charcoal irons on the list. It may also be observed that the positive blower is very much in evidence, and that the blast pressures run quite high. As the tables really explain themselves, they follow without further comment."

TABLE VIII—RAILROAD CASTINGS.

	NUMBERS.		
	36	37	38
Usual Tonnage	47	32	6.5
Time of Heat, hrs. min.	5′ 20″	3′ 45″	2′ 00″
Blast pressure, oz.	16	4	9
Fan or Blower	B	F	
Pig Iron	Coke	Ch. & Ck.	Coke
% Southern	None	60	None
Fuel used	Coke	C'k & C'l	Coke
Scrap bought	None	None	
Pig iron used, lbs.	66,500	25,000	6,765
Scrap used	28,500	39 000	6,235
Castings made	60,400	54,000	10,000
Scrap made	28,700	7,500	2,385
% Melting loss	6.1	3.9	4.7

Note—No. 37 is average of 27 heats.
No. 38 is average of 25 heats.

TABLE IX—FLOOR PLATES, GRATE BARS, ETC.

	NUMBERS.	
	39	40
Usual Tonnage	30	3
Time of Heat, hrs. min.	3′ 40″	1′ 00″
Blast pressure, oz.	16	
Fan or Blower	B	F
Pig Iron	Coke	Coke
% Southern	None	
Fuel used	Coke	Coke & Coal
Scrap bought	Med. Machine	Lt. Machine
Pig iron used, lbs.	20,000	None
Scrap used	40,000	6,000
Castings made	47,400	5,100
Scrap made	8,200	525
% Melting loss	7.3	6.2

TABLE X—CAR WHEEL.

	NUMBER.
	41
Usual Tonnage	200
Time of Heat, hrs. min.	7′ 00″
Blast pressure, oz.	10
Fan or blower.	B
Scrap bought.	Wheel
% Melting loss	2.1

* * * * *

The difficulty which stands in the way of obtaining reliable information in regard to the melting loss in cupolas is the same as confronts nearly every other investigation it is proposed to make in the foundry, viz.: lack of exactness. The condition in which pig iron and scrap is charged into the cupola has, of course, much to do with the loss which is noted. Rusty scrap and more or less sand adhering to the iron will, unless exceptional care is taken, always remain uncertain quantities and tend to confusion if it is attempted to make comparisons. Then again carelessness in weighing charges has much to do with the unreliability of the final figures; in fact, Secretary Moldenke's admission that many reports had to be discarded shows how difficult it is to obtain records of this kind which are of any real value.

The appended tables can be safely taken only as an indication of what some foundries believe they are doing. It may be true that the figures represent the actual loss of iron they have experienced in a certain number of heats, but they certainly do not represent the actual loss in melting. We do not have to go far for the cause of this when we stop to consider the wide difference existing in methods of recovering iron from the cupola dump and also the metal which is spilled around the pig beds and on the molding floors. The only way the actual amount of iron lost in melting can be ascertained will be to have the iron as clean as possible before charging and will require that all refuse after the heat shall be carefully

crushed and the iron recovered either through a magnetic separator or a water cinder mill. Without very careful precautions all records relating to the loss in melting are distorted. This appears distinctly in the tables, where the loss varies from 1.7 to 13.6 per cent. Needless to say comparison is out of the question. No doubt some of the foundries reporting come very near to the actual figures, but the majority show more or less guess work, and there are no details quoted in regard to the condition of the metal as charged, or the care taken in recovering it from the cupola dump which will enable anyone to say which are right and which are wrong.

While many foundrymen will show a willingness to lend support to investigations such as Mr. Moldenke undertook in the present instance, it is to be remembered that they will not change their shop routine. In short, they will fill out a blank without giving a thought to the fact that it must be reliable to be of any use. The very same difficulty stands in the way of obtaining a really reliable report of the amount of coke our foundries use in melting iron.

These tables are interesting in other ways and further confirm the lack of uniformity in foundry methods. We differ from Mr. Moldenke, who considers the blast pressures shown quite high; in our opinion they are just the opposite. Out of 41 reports only 31 give their blast pressure, and this is probably more than a fair percentage of the foundries in general who pay enough attention to their blast pressure to insist on knowing what it is. Eighteen out of the 31 reporting show a pressure below 12 ounces and 12 show a pressure not exceeding 8 ounces. One foundry reports that it melted a 32-ton heat with a pressure not exceeding 4 ounces. If there is economy in high pressure this concern does not seem to have found it out. Four others melted their iron with a pressure not exceeding 5 ounces, the largest heat exceeding 41 tons. These are rather remarkable instances of low pressure in melting heavy heats. Only three foundries report using above 14-ounce pressure. Twenty-three foundries used the pressure blower, 16 employed the fan and 2 evidently have some kind of a contrivance for making wind which can not be indexed or else they thought it was of no interest to others to know it.

There is other interesting information brought out in these tables. Probably but few of these foundries thought that they would also clearly indicate their ability as scrapmakers, which they do, and much more correctly, than they show their loss in melting. The word scrapmaker is here used without the least reflection on any one, as, of course, the amount of scrap made must vary much with different classes of work. Of the foundries in table 1, Nos. 1 and 5 show very good work, No. 2 fairly so and Nos. 3 and 4 may have had a light class of castings.

In light jobbing, table 2, No. 7 makes a fine showing. Table 3 shows some wide variations in making light machinery castings, No. 12 making 2,762 pounds of scrap to 3,738 pounds of castings, while No. 11 only made 900 pounds of scrap in making 10,000 pounds of castings. The freedom with which ciphers are used in some instances gives us a serious doubt as to the correctness of these reports, and several show on the face of them that they are of no value and entitled to no reliance. For instance, No. 15 reports that he used 28 tons of pig iron and 12 tons of scrap, that he received from this 30 tons of castings and 8 tons of scrap and that he lost 2 tons of iron in the deal. A report of this kind is entitled to no credence. There is no foundry which can run a heat of 40 tons and have everything come out in even ton lots. Had careful weighing been done, there would have been different figures. True, one man's guess may be as good as another's, but it seems to us as if in a report purporting to investigate the loss of melting, that such carelessness as here shown should have no place.

Table 4, heavy machinery, also shows some oddities. No. 19, who made 3 tons of scrap in making 9½ tons of castings, must have had some heavy feeding heads on his castings or have lost a casting or two, or perhaps had a strike of molders on his hands. The same remarks apply to No. 17.

All the foundries represented in table 5, stove plate, show good records in the percentage of scrap to castings, which is more than can be said of the heavy machinery founders.

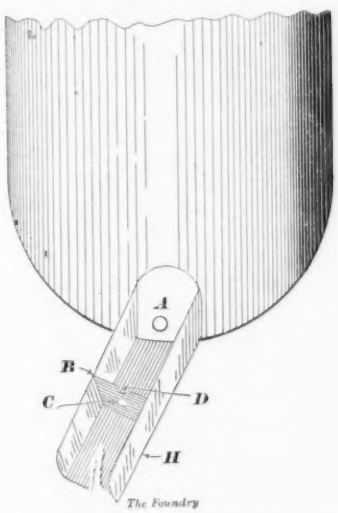
The sanitary ware foundries, table 6, show good records, and quite a few of them give evidence of having tried to answer the questions asked them intelligently. For the same class of work the difference shown in melting loss, 1.7 to 8, is too great, though local shop methods will account for this. One agricultural shop, table 7, No. 35, shows that it knows how to make scrap, this being 10,650 pounds

to 7,450 pounds of castings. It must be a peculiar class of agricultural castings which under ordinary circumstances would show such a result. Perhaps it needs to have its patterns grouped. There is great variance in the performance of the foundries making railroad castings, table 8. It would be interesting to know the causes back of the record made by No. 36, which shows a too large percentage of scrap to castings made for a railroad shop.

Taking it altogether the figures compiled by Mr. Moldenke are interesting, but it is doubtful if he can "interpret the results intelligently" from the bundle of conundrums the foundrymen have unloaded upon him in the shape of these reports.

A Self-Skimming Cupola Spout.

Here is a sketch of a method I use in our foundry, which is useful in any shop where it is desired to run off a heat without plugging up or tapping out the cupola. The breast of



the cupola is shown at A. H is the spout in which B forms a dam. The part B has a small hole at C and a small notch at D in top of dam.

I have never seen this used in other foundries, but feel sure that more would use it all the time if they knew thereof and gave it a trial. In building up the spout the dam is simply put in and a hole left at C, after some of the iron has run out of the cupola the hole C is stopped up with fire clay, and as the breast hole in the cupola is lower than the notch in top of the dam at D enough iron will melt until this height is reached, when it will run over and into the ladle. As all the slag in the cupola is kept on a level with the top of the dam, and this is higher than the breast hole, nothing but clean iron can be drawn from the cupola, and no attention need be paid to this from one end of the heat to the other. It forms the best automatic skimmer to my knowledge. WM. GILBERT.

CAST IRON NOTES.

Devoted to inquiries from Practical Foundrymen on the subject of Melting and Using Cast Iron. Address all inquiries to W. J. KEEP, care of The Foundry.

UNEVEN GRAIN OF PIG IRON.

Question.—The fracture of the pig is very open at places, and yet there are spots with a very close grain. What is the cause of this, are these spots hard, or do they contain some of the ingredients that have not been thoroughly mixed?

Answer.—In the first place no one has been able to explain the close even grained spots which are found in the fracture of a pig and which are surrounded by more open grains. There is no difference in the analysis of the close and open part which will explain it. It is quite possible that in filling the pig mold some of the iron has become crystalline on the side of the mold and for some reason becomes detached and mechanically mixed with the fluid portion. Such portion would have a close grain from sudden cooling, while the more fluid surrounding portion, by cooling after the flow had stopped would have a more open grain. Much pig iron has a close grain around the edges of the pig. This closeness shows a tendency to chill. It may have been increased by the sand of the pig bed being too wet. The close spots just referred to do not seem to exert any influence on castings made from the iron, but I would rather have the fracture uniform and open. I do not think you would get any information on this subject by subjecting the samples to a chemical analysis.

FERRO-MANGANESE ADDED TO FLUID IRON.

Question.—We make ordinary machinery castings with the exception of the smaller type of gasoline engine cylinders. Our heats are all soft iron except about 400 pounds, and if we make a whole charge of hard iron there

is no work that we can put the remainder of the hard iron into. Can I put ferro-manganese in the tap ladle and then tap the required amount of soft iron into it, thereby getting the required hardness? Is there any other way for me to get the close grain and hard-wearing surfaces?

Answer.—There is no objection whatever to your trying ferro-manganese for this purpose. It would harden the casting, but would not make a much, if any, closer grain, and unless the iron was very hot there would be pieces of ferro that would not melt. These hard spots could not be cut when you finished the casting.

A few years ago a manufacturer of locomotives had hard spots in his cylinders and by leaving out of his mixture one iron that carried about 1 per cent manganese the hard spots disappeared. I now have no idea that it was the manganese that caused the trouble, though I thought so at the time.

By melting the hard iron that you speak of first on the bed and having a larger charge of coke on top of the hard iron, you can make the iron charge as small as you choose and can draw it all out before the softer iron begins to melt. If you charge the amount of hard iron you need directly on the bed and draw it off as fast as melted and then stop up the tap hole until you have some of the soft iron melted you need not vary the coke charge at all, for if a little hard iron should remain, the soft iron would mix with it and the difference would not be noticed, or you could pour the next iron tapped into some of your larger castings.

A good way to make a hard, close-grained casting is to use a large proportion of stove plate scrap, say two-thirds of the charge. This iron, while close and quite hard, can be cut without any trouble, and will not injure any of your castings. I would not wonder if you could use these proportions in your whole mixture. It makes the best kind of hydraulic work. I have often advised using clean, coarse drillings and chips of cast iron packed in pine boxes holding 100 pounds, more or less, and charging, say, one-tenth as much as pig iron and other scrap.

HOW TO MATCH A CASTING.

Question.—Can you analyze a casting and prescribe a mixture that will have the same toughness or hardness?

Answer.—Toughness and hardness do not to any great extent depend upon the general chemical composition of the iron; however, if you have a casting that you wish to match, about the only way is to find its composition.

You will then be obliged to find by analysis the composition of the pig iron and scrap that you have or purchase iron that is of the composition that you want. Then you must analyze the casting you make to see if you have succeeded in getting the same composition that you expected to get. The hardness will depend largely on the percentage of combined carbon or manganese and you cannot be certain that the casting will be as calculated.

If you are casting every day there is no use going to all of this trouble, for you can test the physical quality of a casting made from your ordinary mixture and by varying your mixture you can very soon match any casting, so far as its physical properties are concerned. Generally you would wish to match the physical quality of a casting rather than its chemical composition.

Recent Molding Machine Patents.

Joseph G. Johnston, of Detroit, Mich., has taken out a number of patents on the molding of car wheels which have been assigned to the American Car & Foundry Co., of St. Louis. They all relate to the machine of patent No. 672,778, which is of the turntable type, suggested by Guntz, Richards, and others; machines coming within this class having been successfully used for the molding of radiator sections by Bryant and Field. In the machine shown by Mr. Johnston the table is capable of accommodating four car wheel patterns. The same inventor has patents Nos. 670,613 and 678,256, which relate to the drag and cope patterns used with this machine. Mr. Johnston also holds patent No. 671, 702, on an apparatus for drawing patterns from flasks. His patent, No. 671,137, is for the general arrangement of a plant to be used in connection with this machine. It provides for an endless carrier, in connection with a molding machine, upon which the flasks are placed, a track extending over a portion of the carrier on which the pouring ladle is conveyed to its proper place. It also describes a series of conveyors for returning the empty flasks back to the molding machine and other devices for the disposition of the castings and the sand used in molding.

J. R. McWane, president of the Lynchburg Plow Co., Lynchburg, Va., has recently patented some practical devices for molding cer-

tain plow castings. They are Nos. 682,484, 682,485 and 682,486.

Simon H. Stupakoff, of Pittsburg, has secured patent No. 672,542, on a molding machine in which the patterns are mounted on a plate, which by means of a cam is given a slight horizontal circular motion, this enlarging the mold somewhat, as is the case with hand rapping. After the pattern is freed from the mold in this way it is drawn downwards as usual. What is sought to be accomplished is to do away at once with the use of the stripping plate and hand or machine rapping. The construction shown is very simple.

John C. Reed, of Allegheny, Pa., has obtained patent No. 670,441 on a device for molding bath tubs, in which the pattern is mounted on a frame that is capable of a slight movement in the bottom of the flask. This frame has a projection which is perforated for the insertion of a lever which is used to vibrate the frame and pattern to loosen it from the sand. The inventor claims that this vibration or tremor is insufficient to enlarge the mold appreciably and merely operates to settle the sand, so to speak, away from the surface of the pattern. The same inventor also holds patents Nos. 678,976 and 678,977, on other devices for the molding of bath tubs. They relate principally to the design of flask and pattern.

In this connection may be mentioned a patent secured by W. W. Chapman, of Prescott, England, on a bath tub mold, No. 682,641. It relates to a metal mold with a collapsible core. The description indicates a very highly complicated construction, so much so that the inventor's method seems impracticable.

Philip T. Handiges, of Detroit, Mich., has assigned his patent, No. 681,785, to the Michigan Malleable Iron Co., of Delray, Mich. He has introduced a new feature in molding machines, namely, the use of lazy tongs to raise and lower the pattern through the stripping plate. The guide for the pattern is also, in a sense, new in this country, although it has been used in England. It consists of one stationary standard at the center of the machine and pattern, so that the pattern when in its lowest position passes down over the standard and the latter is entirely contained in the hollow pattern. It is intended for castings like oil-boxes. The machine does not have to be as high as is usually the case for the lazy tongs fold into a very small compass under the pattern.

A. E. FAY.

Steel Molding in Green Sand.

Away back in the early eighties, while working in the foundry of the old Vulcan Steel Works, in St. Louis, the foundry department of which made nothing but repair work in cast iron for the mills, there was one small piece which was worn out so quickly, or broken so often, that the master mechanic concluded to have one cast in steel in order to try the lasting qualities of that metal.

The job was molded in dry sand, according to instructions, and when properly dried the mold was hauled in a cart from the foundry to the converting mill, lifted out and made ready to cast. The steel was made by the Bessemer process, and when poured into the mold would not lay there. It did not blow, but kept coming out of the pouring gate and riser; several shovels of sand were thrown over the gate and riser, and weights placed thereon, but the effort was a failure, as the casting was partly hollow and honeycombed, and of course useless.

The attempt to make this casting of steel was tried several times afterward, but with the same result. I had never heard the cause of this failure explained then nor since until just recently, in conversation with the foreman of a steel foundry in the Pittsburg district, when I explained to him the details of our early trial, whereupon he advised me that the difficulties attending the casting of Bessemer steel had been overcome, and started to explain the whys and wherefores, when our conversation was suddenly interrupted.

Most molders at that time shook their heads knowingly at the future possibility of casting steel at all, and while I cannot say that Bessemer steel is being successfully cast in sand molds, I am positive that steel made by other processes is, and in green sand at that. When some of the steel foundries for certain classes of work set aside dry sand molding the next step taken was to skin dry the mold with gasoline, which was applied quite freely, and the method proved a success. Later on the gasoline was dispensed with and the molds cast in green sand, as is being done in many steel foundries to-day, except that in some instances the gate end of the mold is dried with gasoline, and wherever possible a dry sand slab core is rammed up on the side and bottom of the mold where the metal strikes on entering. If the pattern is of unusual design and an ordinary slab core will not do then a core box is made which will turn out a core conforming

to the particular shape of the pattern at the gate end. It is also the rule that instead of cutting a gate, as is done in green sand molding, a dry sand core is used for this purpose. If there is danger of breaking the gate core while ramming up the mold, a block or print is used, and when the mold is being finished this is drawn out and the gate core placed where it is wanted. What is called a stem core is usually rammed up in the cope. This is about 4 inches square, the depth of the cope, with a hole about two inches in diameter through it, and when the cope is closed on, this connects with the dry sand gate core in the drag. A dry sand runner box is then placed on top of the stem core, thus giving the metal a dry sand route from the time it leaves the ladle until it is about 14 inches inside of the mold. After passing this point the rush is over and the metal starts to roll and seldom does any damage unless a very soft spot is encountered.

There is no question about this dry sand gate arrangement being almost the whole trick in green sand steel molding, as the metal is poured from the bottom of large ladles and goes through the gate into the mold with terrific force which, without the dry sand gate, would be liable to tear everything beneath it. The importance of this form of gating molds may be judged from the fact that it was the cause of a long-drawn out law suit between the Shickle, Harrison & Howard Iron Co. and James McRoberts, superintendent of the American Steel Foundry Co. of Granite City, Ill. Mr. McRoberts is not a molder, but was formerly superintendent of the Shickle, Harrison & Howard Iron Co.'s steel foundry, and the story goes that he was the one who got this gate up and applied for a patent on same. While this was pending he was engaged by the American Steel Foundry Co., and the gate was used in this company's foundry also. Later on it was said that Mr. McRoberts obtained his patent and a suit followed between him and the firm named, but it seems that all differences were agreeably adjusted to the satisfaction of all, since both firms have been using this method of gating their castings ever since.

The facing for these green sand molds in which steel is to be cast is mixed in a pan-mill about six feet in diameter which revolves with two rollers turning in it. Men feed the machine on one side and others shovel the facing out on the other. Different mixtures of facing sand are employed, but silica sand is the principal ingredient, with a little molasses and fire clay mixed in at times. The writer has worked in one of the shops named on two occasions, each time under a different foreman. The first time we vented the molds, much the same as is done in green sand molding, and then I used to wonder how melted metal could lay on sand that we used to ram so hard. The next time I worked there the vent wire had gone out of fashion and nobody vented their work, and the metal laid to the sand just the same. Then another new foreman came, and he insisted on having the vent wires used again, when it became a habit for the molders to just stick these in far enough to give the molds the appearance of having been well vented, and the result, as far as the castings were concerned, was the same, when the facing wasn't too wet and the mold rammed hard enough.

The specialty of the steel foundries named is car castings, for the construction of trucks, and consisted of what is known as transoms, bolsters and casings. The latter is of much the same design as a box column. It is about 4 feet 6 inches in length, the depth and width being about 16 inches. The thickness of the casting is about ⅝ of an inch, the core as well as the mold being made in green sand.

When the molds are closed and clamped they are hoisted up and swung away to the casting floor and the molders never hear of them any more unless a flask should run out or the casting is defective. The system by which things are kept track of is that each floor has a letter which is stamped on each mold, and the latter is chalkmarked on the outside at the gate end of the flask, and if the latter runs out or chances to be "blind," the foreman knows just where to go to do his "barking." If the casting is lost through any fault of the molder the letter stamped on it shows the floor it came from.

The flasks of any particular job are made interchangeable, and in shaking out six or eight copes are piled one on top of the other, and swung to the floor where they belong. Two men follow and proceed to shake out, or rather try to see how many bars they can knock out—hot sand, gaggers, broken bars and all, leaving an awful mess. The castings are lifted out of the drags two at a time and six or eight drags are hoisted, sand and all, and swung over to some floor that needs sand and shook out one at a time. By an ingenious

hitch of the chains a drag is turned over, the sand dumped out and the drag set on a board where wanted, and this hitch is so neatly executed that the bottom board never falls off the drag when turned over, and the hooks are on the handles the same as if the drag had been lifted from the floor in that position.

The molding machine has also found its way into the steel foundries, and in one of the shops named has made a steady inroad on the number of molders employed, until there are only a few of them left, but it is reported from a reliable source that it takes one furnace all its time to melt up the wasters. These molding machines are in a class of their own, built by the firms using them and are different in every respect from anything the writer has ever seen in a foundry or on paper. When the cope part is almost plain, it is lifted off of the machine after the pattern has been

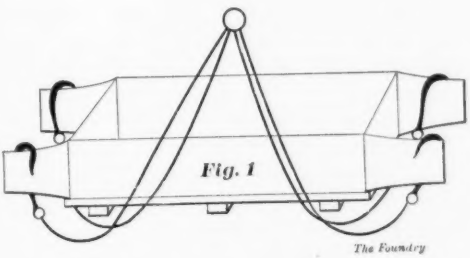


Fig. 1

dropped through the stripping plate, but when the pattern is all in the drag and the latter is rammed up without bars in it, then the drag is clamped to the machine, which has trunnions on it, and the drag and machine are turned over together, when the pattern is drawn up with a lever and the machine is then lifted off and set aside ready for the next mold. The operators of these machines are not known as molders, but are commonly referred to as "rammers." One crew works on copes altogether and another on drags, while a molder usually does the finishing and sets the cores. The "rammers" of the steel foundries in Granite City used to have a society of their own some time ago, which was known as the "Bull Pup Union," but a dissolution came when the president, together with the secretary quit and went back "hum" about corn planting time to resume agricultural pursuits.

Fig. 1 will give the reader an idea of the hitch referred to in an earlier part of this article as employed in shaking out drags and turning them over, at the same time retaining the bottom board in position after the sand has been conveyed in them to the destination where it is wanted. B Fig 2 is the stem core that is rammed up in the cope and connected with the gate core C when cope is closed. A

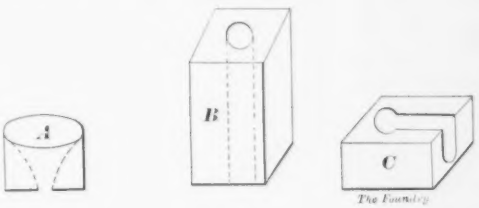


FIG. 2.

is the gasoline dried runner box, which is notice several criticisms on an article written sand is banked around it to insure against a runout at that point. C. RITIC.

One Thing and Another.

To the Editor:

In the October issue of THE FOUNDRY I noticed several criticisms on an article written by me. Mr. Moore may be correct when he says that in most cases one feeding head on a casting is preferable to a number of these. I consider this a matter of opinion, depending upon the shape of the casting and other conditions. I have enjoyed reading many of Mr. Moore's articles and realize that his long experience adds weight to what he says. I simply told how the casting was made and molded and I know results were gratifying.

If "Pattern Maker" could have heard some of the criticisms made on his article, "Amateur Molders," in the same issue I am sure he would hardly have liked their tone. No man in giving his ideas to the public realizes that he lays himself open to criticisms more than the writer. On general principles I have refrained from answering many of these, as I accord to others the right to hold individual opinions just as well as I do. There are but few men who will always make the same casting in the same way, since each will be apt to see room for improvement in their method of molding. In whatever examples of foundry practice I have described, I have simply told the best way I knew, how satisfactory castings were obtained. My foundry experience covers a period of nearly thirty years on a great variety of work. A large part of this time I have been foreman of shops. I think I have

had as much experience in the foundry business as "Pattern Maker" and I am hardly entitled to the distinction of being called an amateur. When I go to a firm and agree to make their castings at so much per pound I take their patterns as I find them, and I am not in the habit of asking a concern to have their patterns altered to conform to my own ideas. Anyone acquainted with soliciting work can judge what answer I would receive should I do so.

"Pattern Maker" speaks of the lack of technical education among foundry foremen and infers that they lack this to such a degree that consultation with them is profitless. While it is true that many foundry foremen could know more than they do, still the question must be answered: How is it that they are able to hold the position of foundry foremen and how did they obtain this? Is it not because they are recognized as able to control and direct others? If they are lacking in technical education the American spirit of "get there" is in them, and when results are to be accomplished they have the brains, power and ambition to produce them. On the other hand, a man could certainly not have gone far from home, and surely must have had a very limited experience, if in his twenty-five years' acquaintance with foundry foremen he could find but one whose opinion was valuable enough for him to consider. Is it not a fact that for years past there has been too much feeling between different trades and each has shown an inclination to underestimate the difficulties with which the other has to contend. I know that in years gone by the molders would unfeelingly refer to the pattern maker as a "wood butcher," and the latter would retaliate by indexing the molder as a "sand rat." In coming in contact with different trades it seems to me as if we are coming to a point where all will work for the common good and make more allowance for the faults of each and be more ready to aid and co-operate to obtain the best results. But when I read an article like that on "Foundry Costs," also written by "Pattern Maker," which, in my opinion, seeks to belittle the men in charge of foundries and hold them up as a class whose opinions are comparatively worthless, then I still find the old spirit of jealousy and combativeness, and such articles leave me to infer that after the pattern maker has made his pattern he can go out into the foundry and tell how it should be molded. Such unkind criticisms are in contrast to those I have received in my contact with pattern makers, from such men as J. M. Richardson, whose acquaintance it is a pleasure to enjoy. He is a man who thoroughly understands his business and is spoken highly of by those who know him best. He is ever ready to exchange ideas and treat others and their opinions with the courtesy and consideration which is shown himself. I consider it an honor to have met many pattern makers. I have found them generally courteous and gentlemanly, and while holding opinions of their own, they were ever ready to exchange ideas, and if a foundry foreman did not understand some particulars they tried their best to explain them as they understood them. I have also met a few who knew it all, and in their opinion were the stars in the trade. Perfection is seldom reached by anyone, and when it is, no matter what the nationality of its possessor, he is soon claimed by the gods. Go where you will among mechanics you will find them trying to obtain more knowledge about their own particular line of work. They are ready to exchange ideas, to impart to others what information they can. It is true that in writing on mechanical subjects your ideas and explanation may seem crude to those who have received more than yourself, holding a greater and higher position, yet there are others to whom many times you may impart useful information and help them along just as there have been many times when the same information would have been thankfully received by yourself. Knowledge is not acquired in one mighty bound. It has taken years of experience, study, thought and close application to problems at the right time to place some of our best mechanics in the positions they hold to-day.

If one writes to help along others with the hope of seeing his craft advance, then their troubles and the obstacles they encounter may be better understood, and show it requires something besides brawn and muscle, that in every way it is brains which conquer and brains which have worked out some of these problems, and brought to a gratifying end the difficulties which originally beset them. While criticisms should always be invited, yet no one should make a specialty of throwing stones from behind a nom de plume. If you have opinions and hold these honestly and believe in them, write them up fearlessly and courteously, and others will honor you.

R. H. PALMER.

The German Foundrymen's Association.

The United German Iron Founders held a well attended convention at Dresden, Germany, during the month of August. The meetings were presided over by President Buderus. A report was brought in by Recorder E. Scherenberg on the new German tariff, in which he stated that the classification of castings asked for by the association had been favorably received. The present depression in German trade was dwelt upon especially in so far as it referred to the foundry business. During the discussion it was shown that many foundries had bought enough iron at the highest prices of 1901 to last them through the year 1902, and that now there is not only a decrease in demand but also in the prices of the products, so that quite a few were operating at a loss. As a remedy for the existing conditions a commission with Herr Wandesleben as chairman, had been appointed to bring about an understanding among the managers of the foundries. This commission made a proposition to restrict importations of iron and regulate prices.

After discussion of these matters Herr Bolze, of Mannheim, proposed the establishment of specifications for foundry coke. He stated that for some time the coke used by the German foundries had been deteriorating, chiefly on account of containing an increased percentage of sulphur. He also stated that the German coke was higher in ash than what is considered normal. The importance of considering the amount of moisture contained in coke was also dwelt upon and it was contended that beside adding weight to the coke the vaporization also has a tendency to break up the fuel into small pieces. The speaker said that it was of the greatest importance to the whole iron foundry trade that regulations for the maximum contents of sulphur, ash and moisture should be established. Herr Bolze also drew attention to the practice in the United States, holding the opinion, however, that the American specifications were not suitable for German conditions, as the German coke differs from the American. In conclusion he recommended that a committee be appointed which, with the assistance of scientists and also of the coke syndicate, should draw up specifications for foundry coke and methods for testing it. A motion to this effect was adopted and Professor Bunte, of Karlsruhe, was asked to assist the committtee. A previous motion to consider specifications for pig iron was postponed until the question of coke specifications was settled.

Chief Engineer Carl Rott, of Halle on the Saale, read a paper on the "Baby Bessemer Process" and its adaptation for the making of castings. This may be considered a continuation of an article appearing upon this process in THE FOUNDRY for October, 1900. The author stated that the beginnings of this process were found in Avesta, Sweden. The first means for refining metal were little blast furnaces with side tuyeres. The Swedish iron favored rapid decarburization, after the termination of which process, the product could be used in making castings without the addition of other metals or carbon. At this period, and later, experiments were being made in France, England and Belgium to make the Bessemer converter in smaller form suitable for producing metal for steel castings. More than twenty-five years ago the attempt was made in Germany to cast steel from small converters. To Engineer Roberts, of Paris, belongs the credit for developing the "Baby Bessemer Process" and giving it wider scope, although a Mr. F. Seroz claims the credit of originating the side tuyeres and even the whole arrangement of the Robert converter. At Steuay they used tangential side tuyeres and then introduced the blast through the middle axis of the oscillating convertor. Then Walrand adopted bottom tuyeres for charges varying from 800 to 1600 pounds, and in 1894 Tropenas came forward with a modified steel process, in the description of which Herr Rott agrees in most particulars with the description given by Mr. Tropenas in his recent article on the process which appears in the last issue of THE FOUNDRY.

Herr Rott complains of the backwardness of Germany in this industry, while her neighbors on the north and west are progressing, even Russia having in use a dozen Baby Bessemer plants. The German foundry owners and steel manufacturers are now grappling with the problem of perfecting this process so that it will meet their requirements.

Williamson, of Wishan, Scotland, has connected the converter with a gas generator and this would be practical if it were not for the high cost of installation and maintenance. The small converter with hand manipulating devices can be installed for about $250 and needs no expensive heating apparatus. The speaker said that he used a simple and very cheap charcoal gas producer. The converter which he uses differs from the Tropenas converter

somewhat in the arrangement of tuyeres. The main part of the shell is also made in two pieces of about the same size and so arranged that it allows repairs to be more easily made. A belt driven air compressor is used, although he states that any good make of pressure blower may be employed. He claims the same advantages as Mr. Tropenas and considers the process especially valuable in the production of smooth soft castings, free from blow holes and having a high tensile strength. The metal may be cast in either baked or green sand molds. The furnace as illustrated by the author, however, is designed for smaller outputs than those obtained by Tropenas, Walrand and others, and he is not trying to compete with the Seamans-Martin furnace, as he only produces small and medium-sized steel castings, which bring higher prices. The converter he uses will receive a charge of about half a ton of metal.

He mentioned the idea of Raapke to introduce compressed oxygen into the Bessemer converter which allows the use of a smaller blowing engine. The use of oxygen is not new, but it cannot be used by the public so long as Raapke's method of introducing it is honorably recognized.

Herr Rott gives the cost of setting up his converter in a foundry, near the cupola, where the metal can be run direct into it, as follows: Foundation and tuyeres, $250.00; compressor and accessories, $1,000.00; other necessities, such as a small furnace for melting the alloys, to be added, chimney, casting devices, etc., $250.00; total, $1,500.00. The chief advantage of the process lays in its ready adaptability to various needs. Whenever the molds are ready or a sudden demand arises the converter can be put into operation. The highly heated metal is suitable for delicate castings. Considering the great advantage and few disadvantages of the Baby Bessemer Process, the author claims that it is already becoming of far reaching importance in the foundry industry. Its superiority over crucible furnaces is fully recognized, and it remains the most rational apparatus for making the smaller class of steel castings. Where steel castings of large sizes only are to be produced the Seamans-Martin furnace will continue to be used, but where small castings for various purposes of good quality are wanted the small converter will supply all requirements.

Herr Rott also read a paper on gas heated drying ovens. He spoke of the ordinary methods of heating, the unwholesomeness of the air in rooms containing dirty and sooty ovens, and of the prominent services of Herr John (a foundryman) in using steam to overcome these disadvantages. The author contends that gas is used in many other industries for ovens and furnaces, and asks the question why this form of fuel should not also be employed in foundries. While it has been used for cores and small furnaces, he considers that this fuel should be used in many places where other fuels only contaminate the atmosphere and injure the surroundings. A manufacturer of Halle on the Saale has taken up this idea and put in a gas generator, which supplies three ovens and is in operation day and night, being used principally in drying large molds which have to be finished in one night. He claims a saving of 20 per cent over coke fires, and states that the cost of such a generator and piping is only about $250.00.

Herr Jungst, of Gleiwitz, spoke on "The Testing of the Mechanical Properties of Cast Iron and Casting." He closed his address with a proposal to appoint a committee of four members to get up a set of specifications for the testing of cast iron, and Messrs. Jungst, Heckmann, Wust and Jolly were appointed. Dusseldorf was chosen as the next place of the meeting of the association.

A. E. FAY.

Deaths.

William Cribben, for many years foreman of the Cribben & Sexton foundry at Chicago, and a brother of Henry Cribben, died recently after a brief illness.

Clement Studebaker, president of the Studebaker Bros. Mfg. Co., died at South Bend, Ind., Nov. 27. He was born in Pennsylvania, March 12, 1831, and rose from very humble beginnings to one of the greatest manufacturers in the world. The first Studebaker shop was started in South Bend in 1852, with a capital of $68. The business was incorporated in 1868, when the late Mr. Studebaker became president.

John Best, a pioneer manufacturer of Lancaster, Pa., died Nov. 25, aged 80. For fifty years he was actively connected with the boiler and engine works which bears his name, and also heavily interested in a number of other manufacturing enterprises.

John Powers of the Powers Foundry Co., Elkton, Md., died recently of Bright's disease, aged 77 years. Mr. Powers was a native of Ireland, and went to Baltimore when a

young man, engaging there in the iron business. Ten years ago he purchased the Elkton Foundry, which he operated in conjunction with his son, James F. Powers.

Gustave A. Claassen, a pioneer foundryman of Lyons, N. Y., died Dec. 2, aged 70. Deceased was born in Germany and came to this country more than fifty years ago.

William McMillan, chairman of the board of directors of the American Foundry Co., died in St. Louis, Mo., recently, aged 70. Mr. McMillan was best known in business through his connection with the Missouri Car and Foundry Company, of which concern he was president for many years. On the consolidation of the Missouri Car and Foundry Company with the American Car and Foundry Company, Mr. McMillan became chairman of the board of directors of the American Car and Foundry Company. He was actively engaged in business to within a few days of his death.

Personal.

Fred Henschen has been appointed foreman of the Crescent Iron Works foundry, Springfield, Mo.

George S. Griscom, Jr., will be in charge of the Pittsburg office of J. K. Dimmick & Co., of Philadelphia, recently opened for business.

Frank C. Schwoerer resigned the superintendency of the Indianapolis Foundry Co.'s plant a short time ago and is forming a company to embark in the general foundry business.

Wm. Cureton, formerly connected with the Cureton Foundry Co., Mt. Vernon, Ohio, is now superintendent of the Fulton Foundry Co., Cleveland Ohio.

William Bennett has been appointed superintendent of the new foundry of the Coxey Steel Casting Co., Mt. Vernon, O.

John L. Wallace, formerly assistant superintendent of the Indianapolis (Ind.) Foundry Co., has accepted the position of superintendent with the Byram Foundry Co. of that city.

Frank Baldwin of New Castle, Pa., has been appointed general manager of the plants of the Pittsburg Stove & Range Co., with headquarters at Pittsburg.

Fires.

The Enterprise Foundry Co., Kansas City, Mo., operated by Garth & Renshaw, suffered a $3,000 loss by fire on November 22.

The Eagle Brass Foundry, Seattle, Washington, was destroyed by fire, entailing a loss of $8,000.

The plant of the Cambridge Foundry Co., Cambridge, O., was damaged by fire to the extent of $2,500.

Alexander Dick & Son's foundry, at Alton, Ont., was totally destroyed by fire Dec. 4.

The Allen Iron Works of Adams, Mass., sustained damages from a fire, Dec. 4, which necessitated the closing of the plant until repairs can be made.

J. M. Montigel's foundry at Alma, Mich., burned Nov. 24. Loss, $12,000; insurance, $3,500.

The Aurora Bronze & Metal Co., of Aurora, Ill., had its brass foundry damaged by fire, Nov. 23. Jacob Rink is the proprietor.

The brass foundry of the Sanitary Mfg. Co., Hamilton, Ohio, burned recently.

The Enterprise Foundry Co., Cincinnati, O., had its plant slightly damaged by fire Nov. 30.

The plant of the Penberthy Injector Co., Detroit, Mich., was completely wrecked by a boiler explosion Nov. 26.

The Phœnix Foundry Co., of Detroit, Mich., had its plant destroyed by fire Nov. 27. Loss covered by insurance.

J. J. McCully's wagon factory and foundry at Mexico, Mo., burned Nov. 29.

Starke's Dixie Plow Works of Richmond, Va., suffered the loss of their foundry by fire Nov. 28.

The Manhattan Brass Co., of New York City, suffered a $10,000 loss by fire Dec. 5.

The foundry of the Becker-Brainard Milling Machine Co., at Hyde Park, Mass., was recently damaged to the extent of $2,500 by fire.

Among the Foundries.

E. R. Allen, formerly operating a foundry at Corning, N. Y., has built a larger shop at Painted Post, N. Y. James Hoffman is in charge.

The Abbott Electric & Novelty Co., of Warren, O., organized with a capital of $60,000, recently elected H. H. Hammond, president; E. L. King, vice-president; W. J. Peck, secretary and treasurer. The latter will also act as superintendent. The plant will include a brass foundry.

The Crescent Brass & Iron Co., of Detroit, Mich., has been succeeded by the Buckley-Hart Mfg. Co. The company manufactures cabinet hardware.

The Hildreth Motor & Pump Co. has been organized at Lansing, Mich., to manufacture gasoline engines and pumps. The company is capitalized at $20,000, fully subscribed, and the plant of Hildreth & Co. has been secured to carry on the new business. In the spring an addition will be built to the plant. Lawrence Price has been elected president, W. W. Hildreth, vice-president; L. L. Sattler, treasurer, N. E. Hildreth, general manager, and W. E. Cady, superintendent.

The Standard Pulley Manufacturing Co., of New Orleans, La., has recently been organized and is now doing business at 809 to 825 Tchoupatoulis street. P. H. McArdle is president, C. T. Patterson vice-president, W. P. Simpson secretary, and O. H. Van Horn treasurer. The plant includes a two-story building with 45,000 square feet of floor space and 2,000 square feet of yard room. It will have a capacity of from 8 to 10 tons per day, and a specialty will be made of transmission machinery, including pulleys, boxes, hangers, gearing, etc. It is equipped with a Whiting cupola and Delano and Maywood molding machines. An experienced foundryman from Chicago has been secured as superintendent and the plant will start out under the most favorable auspices.

The Des Moines Gas Engine Co., Des Moines, Ia., have filed articles of incorporation, with a capital stock of $20,000, the incorporators being William Robinson and James P. Morley, and others.

The Middletown Car Works is the name of a new corporation at Middletown, Pa., succeeding Arthur King, for the manufacture of cars. The capital stock is $100,000. Incorporators are Arthur King, George I. King, and Paul A. Kunkel.

The Bessemer Foundry Co., of Grove City, Pa., has been incorporated to carry on a general foundry business in the new foundry now being built by the Bessemer Gas Engine Co. of Grove City. The main foundry building is 100x100 feet. The equipment will be up to date, including a 50-foot three-motor electric traveling crane. The incorporators of the new enterprise are: Benjamin Spearman, of Sharpsville, Pa., president; A. Seton, of Mercer, Pa., vice-president; W. H. Christy, of Mercer, secretary, and J. M. Albin, of Mercer, treasurer, and general manager. The company will manufacture gas engines and other castings, and expects to employ from 30 to 50 men. Operations will begin some time in January. The address of General Manager Albin for the present is Mercer, Pa.

The Sanford-Day Iron Works Co., of Knoxville, Tenn., recently incorporated with $50,000 capital, has organized with E. J. Sanford president, A. B. Day vice-president and general manager, H. W. Sanford secretary and treasurer. The new company succeeds the A. B. Day Foundry Co., and the plans contemplate a large extension in capacity. In addition to manufacturing mine car fixings and doing a general casting business the company will take up the manufacture of stoves.

The Gunlach-Rompel Foundry Co., of Belleville, Ill., has been incorporated with a capital of $5,000 to carry on a general foundry business. J. A. Rompel, L. Rompel and M. Gunlach are the incorporators.

The American Foundry Co. has recently been organized and will erect a modern foundry plant at Mt. Jackson, a suburb of Indianapolis, Ind. F. C. Schwoerer, late superintendent of the Indianapolis Foundry Co., is one of the prime movers in the new enterprise and associated with them will be W. H. Orcutt, formerly treasurer and manager of the McElwain-Richards Co. of Noblesville, Ind.

A company has been organized at Scottdale, Pa., to rebuild the plant of Kenney & Co., recently burned. There has been subscribed $125,000 and the shops will be rebuilt on a larger scale than before, employing 200 men, as against 65 in the old shops. A board of directors has been chosen as follows: A. K. Stauffer, T. C. Kenney, D. B. Stauft, Robert Skemp, E. A. Humphries, J. R. Smith, J. I. Dick, E. L. Rutherford, all of Scottdale, and Worth Kilpatrick, of Connellsville. The officers chosen are: A. K. Stauffer, president; D. B. Stauft, secretary, and Walter F. Stauffer, treasurer.

The Austin-Bryan Mfg. Co., of Ensley, Ala., has increased its capital stock from $75,000 to $150,000. The company manufactures plows and other agricultural implements, and has built up a large export trade.

The Ft. Pitt Malleable & Gray Iron Co., of Pittsburg, with offices in the Shannon Building, will shortly award contracts for the erection of its new foundry at McKees Rocks, Pa. The plant will cover about five acres. The company has been incorporated with $200,000 capital, but this may later be increased to $500,000. A site of 10 acres was recently purchased for $40,000. J. C. Reilly is president

of the company; F. J. Lanahan, secretary and treasurer; E. S. Reilly, manager, and M. J. McMahon, formerly connected with the McConway & Torley Co., will be superintendent of the plant.

The Charlotte Pipe & Foundry Co., at Charlotte, N. C., has commenced erection of the new plant. The main building will be 100x100 feet, machine shop 30x50 feet, etc. Equipment for a daily production of ten tons of castings will be installed. J. J. Beggs is manager.

An addition 75x300 feet will be erected to the foundry of Meerbach & Schneider, Philadelphia. This addition is designed for the manufacture of very heavy castings and one 25 and one 50-ton crane will be installed.

The W. B. Pollock Co. is erecting a foundry and machine shop at Youngstown, O. The plant will have thoroughly modern equipment and be in operation early in the year. There will be a separate office building and the firm has recently moved into a temporary structure near the new works.

The Damascus Bronze Co., of Pittsburg, Pa., are making extensive additions to their foundry and are also installing considerable new machinery in order to meet the present demand for the company's products. The company are also contemplating the erection of seven new furnaces for the manufacture of Damascus nickel bronze, which is being sold under a strong guarantee as to mileage and of a saving of 25 per cent in oil. An order has just been completed for 50,000 journal bearings for use on the new steel cars of the Baltimore & Ohio.

Robert R. Merriam, manager of the Co-operative Foundry & Machine Co., Sandusky, Ohio, has been appointed receiver for the company.

The Best-Scott Foundry Co. has been organized at Warren, Pa., with a capital of $20,000. A shop is now being built 60x128 feet. It will be equipped for heavy work. The officers are: R. J. Scott, president and manager; John Best, vice-president; J. A. Viele, secretary and treasurer.

C. L. Grimes, superintendent, and James F. Warren, foreman of the plant of Williams, White & Co., Moline, Ill., have acquired a majority interest in the plant of the Globe Iron Works, Wichita, Kas., and have changed the name of the company to that of the Wichita Mfg. Co.

The Enterprise Foundry Co., of Bristol, Tenn., has grown to such an extent that its business will be divided. The original company will devote its time exclusively to the manufacture of stoves and to repair work. The boiler shops and brass foundry have been leased to Bateman & Frost, who will conduct this part of the business.

W. M. Morse is building a foundry and machine shop at Union, S. C.

The Advance Tresher Co., of Battle Creek, Mich., is building a new foundry 100x400 feet.

The Vulcan Foundry Co., of Trenton, N. J., will erect a new foundry in the immediate future.

The National Foundry & Machine Co. have been organized at Terre Haute, Ind., for the purpose of manufacturing hay presses, etc., and to do a general foundry business. A new plant will be built, but the site has not yet been selected. J. B. Bergmann is president.

The Lancaster Malleable Iron Works of Lancaster, N. Y., are to be reorganized. The plant will be completely overhauled.

A half interest in the El Paso Foundry & Machine Co., El Paso, Texas, has been purchased by J. S. Carey and A. H. Seep for $50,000. The plant will shortly be enlarged by the erection of a new foundry, 80x160 feet, and considerable new machinery will be installed.

George S. Carter has opened a brass foundry in New Britain, Conn.

The C., B. & Q. Railway Co. is rebuilding its brass foundry at Aurora, Ill., recently destroyed by fire.

The Wolff & Zwicker Iron Works and Shipbuilding plant, in Portland, Ore., have been sold by the receiver to Drake C. O'Reilly for $42,000. The establishment is one of the best equipped in the Northwest. Two torpedo boats and the famous destroyer "Goldsborough" were constructed by Wolff & Zwicker.

Samuel J. Shimer & Sons of Milton, Pa., are erecting a new foundry 40x70 feet.

D. J. Renaud will start a brass foundry at Carthage, N. Y.

The Flint & Walling Mfg. Co., of Kendallville, Ind., are building a new brass foundry and store room for patterns.

R. H. Woods of Rock Falls, Ill., has added a small brass foundry to his machine shop business at that place.

The W. J. Clark Co., of Salem, Ohio, has added a brass foundry to its equipment.

Moore Bros. of Wichita, Kans., will increase the capacity of both their architectural and stove foundries.

The Louis Lipp Co., Cincinnati, Ohio, have broken ground for the erection of a new plant. It will consist of two wings, each 60x520 feet, and will include foundry, enameling room, tin shop, machine shop, engine and boiler rooms, shipping department and offices. The buildings will be one story, of brick and iron, and will cost about $75,000. The company manufacture plumbers' supplies.

Union Lock & Hardware Co., Lancaster, Pa., have disposed of all their rights and interests in the manufacture of padlocks and night latches, together with all their stock, materials, patents, patterns, trade-marks, etc., to E. T. Fraim, proprietor of the Keystone Lock Works of that city, who will hereafter put the goods on the market.

It is announced that the Griffin Wheel Co. will shortly reopen its gray iron foundry at Tacoma, Wash. When the molders early in the year made a demand for an eight-hour day and 40 cents an hour the company closed this department. When work is resumed it will be on the basis on which it was formerly conducted, a 10-hour day, and 30 to 35 cents an hour. The car wheel branch of the company's business has not been affected at any time.

Richard Beaument & Sons of Kankakee, Ill., have had plans prepared for a new foundry.

The Central Foundry Co., Fort Wayne, Ind., has placed its plant in operation. The company will manufacture the Walda sectional sash weights, special door and elevator weights, building castings, grate bars, boiler castings, etc., and the shop will be under the immediate superintendency of Mr. William C. Walda, the inventor.

The Keeler Brass Co., of Grand Rapids, Mich., is doubling the size of its foundry.

The Pennsylvania Casting & Machine Co., of Allegheny, Pa., will build an addition to its foundry.

Charles Simons has sold his foundry at Paragould, Ark., to Bruce Monteith.

The Craig Foundry Co., of Toledo, O., are having plans prepared for an addition to their works, which will be built early in the year.

The Paris Mfg. & Implement Co. has been incorporated at Paris, Tenn., by J. E. Johnston and others, with a capital of $15,000.

The Marine Engine & Machine Co., of Harrison, N. J., is erecting a new foundry.

Joseph Gottstein has sold his interest in the Luxemburg (Wis.) foundry to John Roth.

The Gadsden (Ala.) Pipe & Foundry Co. has filed articles of incorporation. It is capitalized at $50,000.

The Chandler Pump Co., of Cedar Rapids, Iowa, will build a modern foundry early in the spring.

The Fischer Foundry & Machine Co. of Pittsburg, Pa., has been incorporated with a capital of $200,000. It is understood that extensive improvements will be made in the immediate future.

The Lamb Mfg. Co., of Sioux City, Iowa, are equipping their foundry and machine shop for the manufacture of sad irons and several cast iron novelties.

The foundry of the International Fire Engine Co., at Seneca Falls, N. Y., has been closed and in the future all castings for that concern will be made by the American Fire Engine Co.

H. M. Treadwell & Co. have leased the plant of the Lebanon Mfg. Co., Lebanon, Pa., for a term of ten years.

Thos. Furlow & Sons, of Philadelphia, are preparing to build a brass foundry at 2020 Willard St.

Joseph Cockfield, formerly master mechanic of the Northwestern railway shops at Clinton, Iowa, and D. B. Getty, for several years foreman of the machine shop of C. E. Fawcett, of Cedar Rapids, Iowa, have purchased a site in the latter city, on which they will erect a foundry and machine shop early in the year.

The Frayser & Melton Foundry Co. have selected a site at Henderson, Ky. Two buildings are planned, one 40x100 feet, another 36x80 feet.

The Cleveland, Cincinnati, Chicago & St. Louis Railway Co. will add a brass foundry to its shops at Urbana, Ill.

George Rush is preparing to start a brass foundry at South Bend, Ind.

W. J. Reese is making preparations to build a new brass foundry at Quincy, Ill.

The Caldwell Furnace Foundry Co., of Toledo, Ohio, will establish a branch factory at Fort Payne, Ala.

The Garwood Foundry & Machine Co. has been incorporated with a capital of $50,000 to do business at Garwood, N. J.

The Keystone Car Wheel Co., of Pittsburg, whose plant is located at West Homestead, Pa., has increased its capital from $100,000 to $400,000. This increased capital was decided upon to provide for the improvements made during the year, increasing the daily output of car wheels from 300 to 550.

The Eagle Iron & Brass Foundry is a new concern which lately started their plant at Muncie, removing there from Oakville, Ind. Hartley & Crozier are the proprietors.

The Keystone Foundry & Mfg. Co. of McKeesport, Pa., have started operations in their new foundry. It is 60x100 feet in size, and it is expected that by the first of the year it will employ fifty hands. A specialty will be made of stove castings. The officers are W. E. Hartman, president; W. F. McCrea, vice-president and manager; Charles F. DeLong, secretary and treasurer.

The Uneeda Tool & Machine Co. has been chartered to do business at Martins Ferry, Ohio. It will make a specialty of agricultural implements. A. R. Gordon C. B. Gordon, and W. L. Brown are the incorporators.

The H. N. Strait Mfg. Co., Kansas City, Kan., manufacturers of scales, cooperage machinery, hay presses, etc., will shortly be in the market for a complete equipment of machinery. The company have recently purchased three acres of ground adjacent to their plant and will within the next two weeks begin the erection thereon of a boiler room, equipped with three 100-horsepower boilers; foundry, 100x200 feet, and a machine shop, 100 x200 feet, all to be of brick construction. These buildings will be devoted exclusively to the building of Corliss engines, which line of manufacture they propose taking up.

Though the main part of the plant of A. D. Cook, Lawrenceburg, Ind., manufacturer of tube well supplies, steam pumps, etc., was destroyed by fire November 2, the interruption of business will be of short duration, as the molding and blacksmithing shops, newly erected pattern rooms, offices, etc., were saved, and the branch establishment in the suburb of Greendale is ready to supply most of the goods required. The burned part is being rebuilt as rapidly as possible.

Wm. Bros, proprietor of the Nicollet Island Steam Boiler Works, Minneapolis, Minn., is in the market for machinery for his new boiler works, which will be equipped with traveling cranes and all modern appliances. A new power house will also be built. It is probable that a structural shop, together with machine shop and foundry, will be erected in the near future.

The Jacobson Machine Mfg. Co., Warren, Pa., are organizing as a stock company, and are adding to their plant a new foundry. The company manufacture clutch pulleys, power transmission machinery, etc.

The Chicago Ornamental Iron Co., Chicago, Ill., have moved into their new plant at Thirty-seventh street and Stewart avenue. It consists of a pattern shop, 50x94 feet, two stories; fitting shop, 70x150 feet, two stories; foundry, 50x150 feet; plating room, 40x90 feet, and bending room, 40x40 feet. These buildings are all new and equipped throughout with modern appliances.

The Western Malleable & Gray Iron Mfg. Co. will build a new foundry at Milwaukee, Wis.

A charter for the incorporation of the Westinghouse Foundry Co., of Pittsburg, has been applied for. The foundry will be located at Trafford Park, near Stewart Station, Pa., on the Pennsylvania railroad. The incorporators are George Westinghouse, H. H. Westinghouse, George C. Smith, William Scott, and W. D. Updegraff. The foundry buildings and yards will require about 25 acres. It is expected that upon their completion the foundries controlled by the Westinghouse interests in Pittsburg, Allegheny, and Cleveland, O., will be abandoned.

The Detroit Foundry & Mfg. Co. has been incorporated to do business at Detroit, Mich. Its capital stock is $10,000.

The plant of the Flush Tank Co., at Aurora, Ill., has been sold to Love Bros., of that city, representing a syndicate composed of their own firm, the Western Wheeled Scraper Works, the Wilcox Mfg. Co., and Stephens, Adamson & Co. Samuel Reid, who was formerly foreman of the foundry at the American Well Works, will be in charge of the plant, under the new management.

The Philadelphia Foundry & Machine Co., of Philadelphia, has increased its capital stock to $75,000.

The Frankford Iron Foundry Co., of Philadelphia, has been incorporated by Wilson H. George, Chas. S. Coom and Thos. J. Bowen, Jr.

The Du Roth foundry is a new industry at Dawson, Pa., organized to manufacture a car wheel, for which John Du Roth holds patents. H. B. Moore is president, B. S. Forsythe, secretary, and John P. Shallenberger, treasurer. The firm will also manufacture other cast iron specialties.

The plant of the Clark Engine & Boiler Company, Kalamazoo, Mich., is to be greatly enlarged. These improvements will consist of an addition, 52x100 feet, to the foundry, and a new boiler room, 50x100 feet.

The Dunbar Furnace Co. is adding a foundry to its plant at Dunbar, Pa.

The Modern Iron Works has been organized at Quincy, Ill., to carry on a general jobbing foundry and machine shop. Its capital stock is $40,000 and the following names appear among the incorporators: R. Vernon Clark, George Fischer and August J. Niemeyer.

Some Answers to Mr. Roxburgh.

In the September issue of THE FOUNDRY Mr. Roxburgh amuses us by some more of his delightful arguments which are so skilfully expressed that it takes one quite a while to find out what he is talking about. I am taken to task for saying that a mold should be poured as hot as possible considering what heat the facing will stand. Mr. Roxburgh terms this indefinite and evidently wants me to prescribe the temperature to the third point of a decimal under each condition.

What he terms "external influences" have absolutely nothing to do with a casting drawing. The gates, for instance, have nothing whatever to do with this. Some of his theories are at least twenty-five years old and have many times been proved incorrect. A draw is not a development of shrinkage in its primary form, but is the result of crystallization. Crystallization is effected more evenly and quickly the sooner we get the iron from the cupola to the mold, and as it occurs whether the mold is poured with hot or cold iron, it is certainly better to use the metal hot. Again, by pouring hot iron we have the metal as we mixed it and do not to any great extent lose the metalloids which are expected in the casting.

When the crystals form in a casting they go toward the faces of the mold and are much denser at the surface than throughout the interior. Although Mr. Roxburgh says that there cannot be any crowding of crystals, they are crowded at the face of the casting as compared with those in its central part. Since the metal available is only what is contained in the mold the crystals in the central part are larger, owing to this part of the casting remaining hot for a longer time and they tear away from each other because of there being more room for them to fill.

In many castings the central part will become spongy and should the part which remains fluid the longest be near the surface of the casting the skin which has already formed at this point of the mold will subside, thereby causing what is known as a draw. If we arrange the riser or gate so that these will furnish a source of supply and fill up this vacancy as it forms, then as far as shrinkage is concerned we may ignore the pouring, gating and speed of filling the mold. We have many instances in our shop where draws occur on what may be considered light castings, on which we never think of putting risers, because of the extra trouble in molding and chipping. In such cases we cut the runner deep and not very wide and when pouring fill up at once, gradually getting slower as the mold feeds itself, but of course never letting the head down. This practice allows the crystals to form in the casting before the runner has set. If it were possible for us to cut runners in proportion to the size of the castings we would not require feeding heads at all.

Metals having the greatest contraction would the more readily develop draws if shrinkage alone was the cause. This is by no means the case, and I believe that given an iron with practically little or no shrinkage at all we will still have draw holes if the casting was not properly gated and poured. We use an alloy of tin and lead for patterns, and although it only has half the contraction of cast iron it draws far more readily. The reason why a chill used on a heavy part keeps the casting from drawing at that point is that by hastening solidification, the crystals in the center do not have time to form so unequal to those on the outside as to cause this defect. We do not alter the shrinkage, and the magnitude of a draw does not in any way mark the amount of the shrinkage. In fact, heavy castings have less shrinkage than light ones, then why call these draws shrinkholes and their cause internal shrinkage?

I am aware that I am disagreeing with the theories of many founders in these statements, who hold that internal shrinkage must be made up by supplying fluid iron to the exterior of the casting. Now spongy parts and draws are identical in cause. The former occur in central parts on account of thinner parts separating them from their source of supply or runner, while the latter are so near the surface that the skin which had previously solidified falls into the gap.

Unequal solidification applies only to castings of unequal section, but the explanation of the crystals forming largest at that part of the casting which retains its heat the longest applies to all castings; instead of unequal

shrinkage having anything to do with it, it is unequal cooling or crystallization. Dry sand molds are better adapted for heavy castings than green sand molds. The reason is that the iron cools more equally throughout by not being chilled on its face by the damp sand of the green sand mold. Thus we have more equal cooling and therefore more equal crystallization. Of course, there are other reasons for resorting to dry sand molds to which it is not necessary to allude. If we could pour a casting in a red hot mold and allow it to cool gradually throughout we would get the crystals all of the same size and density, and draws would not occur nor would it take any more metal to fill the mold.

GEORGE G. URE.

The Value of Mixing by Analysis.*

BY JAS. A. MURPHY.

The great wave of prosperity that swept over the country two years ago ought to be forever a warning to American Foundrymen to abandon primitive methods of working, particularly when it comes to the mixing of irons. The modern foundry made money during that time, while the shops run on the old principle lost it right and left. As long as the old-fashioned foundryman got the kind of iron that he knew from experience would give him certain results he got good castings; but when the demand for pig iron became so great that foundries were glad to get any kind from No. 1 to No. 3, and of any analysis, their troubles commenced. Castings ran honey-combed, cracked, were too soft, too hard, or had many other blemishes that wore the earmarks of bad mixing.

All this could have been changed if the managers had known how to mix by analysis. It is not a hard matter to learn, and foundry owners should insist on their foremen having that knowledge, for without it at the present time they are not fully competent to be foremen at all. One thing foundrymen should do, and that is, when buying irons to insist on the furnace furnishing a full analysis, and also insist on the coke manufacturers specifying the sulphur of each carload of coke. This, of course, applies to the smaller shops who cannot afford to keep a laboratory of their own, and whose volume of business is not sufficient to warrant them buying entirely on specification. Some furnaces are not strictly honest when it comes to giving an analysis, and these seldom or ever give it unless it is asked for, probably written for two or three times, and then comes something like this: Gentlemen: The last car of iron we shipped you analyzed as follows: Graphitic carbon, 3 to 4; combined carbon, .25 to .65; silicon, 2 to 3; sulphur, .01 to .023; phosphorus, .40 to 1.60; manganese, .50 to .70. Who could put up a reliable mixture from such an analysis? Again silicon and sulphur seem to be all the furnaces care to furnish. These, of course, are very important elements, the most important in putting up a mixture, but knowledge of the carbons and the proportions in which they exist in pig metal is desirable in mixing for high grade work.

Here it seems to me the American Foundrymen's Association might step in and help those of its members whose establishments and business are not large enough to justify the expense of a laboratory. To me it seems possible that in connection with the present standardizing bureau a national laboratory could be established for the dissemination of chemical knowledge among foundrymen, where they could have those requirements studied and reported upon free of charge or for a nominal sum. The establishment of such an institution would certainly make the furnaces pay more attention to their product, and we could depend with greater assurance on our mixtures made from the furnace analysis furnished us. The larger coke manufacturers pay no attention to the specifications of small foundries, but send them anything at all that looks like coke. Coke can be made and furnished in quantities with sulphur running below .75 to large foundries that have a laboratory and buy on specification, but to us who cannot afford such things a coke running from 1.00 to 1.50 in sulphur is sent. To get good machinery castings with such coke requires the nicest manipulation of mixtures and cupola practice, and then there is more or less loss on this account. The association could be of considerable benefit to its members in this direction.

Large and small foundries should buy their iron and coke on specifications and reject what does not come up to them. If this were done universally, the "ovens" would use greater diligence in keeping down sulphur and would send out less burnt and slaty coke to give us trouble and dirty castings.

Many good foundrymen of the old school are under the impression that mixing by analysis is a "hobby" and the knowledge of metallur-

*Paper read before the American Foundrymen's Association.

gical chemistry a superfluous attainment. The sooner they overcome this idea the better. Mixing by analysis is the only correct and reliable way to get desired results, and the sooner it is universally adopted the more uniformly good will be the castings made.

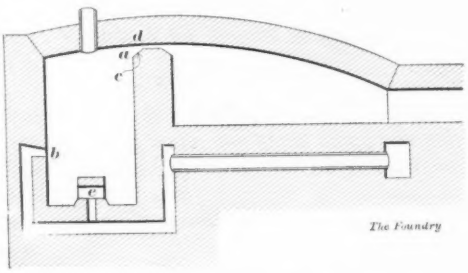
There are many who complain that they cannot get the foremen to mix by analysis and that the chemist is not practical enough. It is very true that the general run of foundry foremen are entirely ignorant of such things, but the reason lies in the fact that until recently there has been no demand for such men. Create the demand and "Young America" will fill the deficiency. There are many young molders studying metallurgy at the present time, and from their ranks will come the foundry foremen of the future. The fact and knowledge of the new school is sure to supersede the rule of thumb methods of the old.

The foundrymen and they alone can change the methods of grading irons. As long as no demand is made on the furnaces for grading by chemical analysis they will not trouble themselves about it. Probably they know only too well that it is a waste of information and a postage stamp to send it to 75 per cent of the foundries of the country. This should not be when good literature on the subject is so easily obtained.

'Tis a common occurrence when buying, say six car loads of one brand of iron, to have each and every one of them a different grade when they arrive at the foundry. At best such things tend to confuse the foreman, and he that does not know anything of chemistry is going to have trouble and lots of it. Of course some foundries can use anything that they can pour out of a ladle in their castings, but it is only to shops doing high grade work that I refer.

Fuel Oil for Melting Purposes.

The experiments made with the oil burning reverberatory furnace here shown give a heating value of one pound oil equal to three of coal, or one gallon crude oil equal to about twenty pounds coke. The oil used is really a petroleum residue called "mazout" in Russia. The dimensions of the combustion chamber naturally depend upon the quantity of oil to be burned per hour, the space, however, amounting to 2½ to 3 cubic feet per gallon oil burned per hour. Three feet seem to be the minimum height at which the oil will fall and gasify properly, this being an important item in the furnace construction. B and C, the air conduits, and the flue A depend also upon the oil burned per hour. Since a gallon of oil requires 15 cubic feet per second for proper combustion, a consumption of five gallons per hour would mean a velocity of twenty cubic feet per second in the flues, or the conduits B and C would be sixteen square inches were it not for the extreme temperature. Allowing for this the area should be 86.4 square inches. Now it has been found that the most favorable height of the flue, A, should be between two and three inches, otherwise the flame will cut out the brick too quickly, which means that the breadth will be about two feet. The oil is fed into the combustion chamber by means of siphons provided with funnels, their number



OIL BURNING REVERBERATORY FURNACE.

being dependent upon the rate of combustion desired. Two gallons per hour per siphon is about right. One-half inch gas pipe will do for the siphons, but if fire brick pipes are used they must be plumb so that the oil does not run down the sides but falls directly on the tile at E. Where this is not the case coke forms quickly and the action ceases. The air supply is regulated by trap doors, and can be warmed by being led through a series of gas pipes laid under the bottom of the combustion chamber as shown in the cut. An air current is arranged to strike the bridge and by thus causing complete combustion effectively takes care of any coke formation.

Those who have used fuel oil will recognize this process very readily, as it has been used successfully in Pennsylvania in more or less modified forms for melting, heating and annealing. It is given here to show the peculiar construction which takes care of the coke formation and at the same time is designed to prevent the cutting down of the brick work to a greater extent than any furnace which has so far come under our observation.—[*Journal American Foundrymen's Association.*

Artistic Bronze Casting—French Sand.

The foundry producing the most common, everyday product has its troubles as well as the foundry producing a perfect cast of some statue or group; and so also has the foundry producing a *cire perdue* cast of some intricate undercut work. I might cite for example a laurel wreath, in which the adjacent undercut leaves are so close together that even the best French sand has not body enough to hold itself together when withdrawn from betweeen the leaves. The progress of brass and bronze founding in our country has been a steady march forward to those who have been interested and observant of what has been going on around them. I recollect that, when an apprentice, the foundries in this country which could turn out a piece of false core bronze work without the most expensive sectional patterns were few in number indeed. Today such work can easily be done in a dozen places in the city of New York, and even the crank who desires that the casting shall be produced so perfect that no tooling shall be necessary can be accommodated by the half-dozen foundries in New York city who are ready to do casting *a la cire perdue*.

To depart from our everyday mechanical grind and to dive into the artistic may not seem proper, yet how many of us are thrown in contact more and more every year with the making of things of decorative character. As Professor Sweet intimated some time ago, that the blacksmith who becomes aware of the fact that there is more work for him when he becomes familiar with decorative work, so would I say to the toolmaker and the molder that the field in the ornamental line is growing, and men who can overcome the difficulties presented in the molding of these more complicated pieces will certainly be satisfied with the results, as far as plenty of work and remuneration are concerned.

While there is a great deal of bluster about what can be done in "our foundry," it is a fact that, as a rule, when a job comes along out of the usual—let us say an ornamental job, having some undercut and intricate core not made easy by sectional patterns—then the boss is at a loss. Several years ago I had a contract to fill out West. A concern having a very large foundry was turning out for the firm with whom I was at the time about a ton of ornamental work every day or two, and the boss told me that, as yet, he had seen nothing in the way of a casting, however complicated, that he could not produce at his foundry. One day an order came in for a nowel post; the square corners of the pedestal were decorated with a ram's head. There was nothing particularly difficult about the piece, and I was surprised when I received word that the piece couldn't be cast, as the pattern was not made correctly. A visit to the foundry proved that they could not make it, as the horns and ears would not draw. A march through the city's foundries, both iron and brass, proved to me that they could not make it. None of the people seemed to know anything about French sand, and as for *cire perdue* methods—well, I did not venture to broach the subject. I returned to the first firm and started to tell them about French sand, its peculiarities, etc., and when I told the proprietors that the sand can be cut into shavings there was a great laugh. However, they begged to have a sample to try; but when they get a sample they will also need a molder who can use it.

All sorts of schemes are proposed, as a rule, to stave off the use of French sand. Make it in sections and braze it together, is the "old man's" cry. The modern architect, however, has seen the product of foundries using French sand, and as a rule he is bound to have his work done as he desires it, even if it is necessary to have it done in some other locality. The brazing of bronze ornamental columns, pedestals, bases, etc., is certainly unsatisfactory to most first-class architects, and, as a rule, is not followed in good practice. While it is true that there are some bronze jobs right here in New York that are simply nightmares, most atrocious in construction and finish, it will be found as a rule that the aim is to reproduce a piece of bronze work bearing the stamp of high-class work from start to finish. Some of the hurdy-gurdy, push-it-out chaps who frequently appear as bidders for high-class brass and bronze work, and who catch an occasional job on account of their low bids are usually satisfied with one trial. It usually turns out a bitter pill for both them and the architects, and they steer clear of future entanglements.

I have been informed that the sands found at Belleville and at Fontenay aux Roses, in France, are the most satisfactory sands used for the purpose of fine castings with good face. The peculiarity of French sand is at once apparent to the observer who watches the molder fitting and cuttting his sections. The cutting of this sand, when prepared for molding, reminds one of the cutting of a sub-

stance that is anything but sand. In the words of one who was watching the process, "it cuts like cheese," and when the metal is poured the casting will prove the strength of the sand by a surface that is obtained by no other sand. There is rarely a wash noticed when using this sand.

Something over twelve years' experience as executive in a foundry in which we tried Connecticut sand, Philadelphia sand, Albany sand, Windsor Locks and French sand, and also gave the system *a la cire perdue* an extended trial and in which we turned out from the plainest mechanical work to such castings as Barye's smaller groups, the Tiger Hunt, Napoleon, Hound and Hare, Lion and Serpent, convinced me that if fine castings were desired with surfaces clean and sound, then French sand fills the bill. The endeavors of those interested in the advance of the art of brass and bronze founding in this country will be considerably strengthened by study and investigation in this direction.—[John G. Niederer in American Machinist.

Real Shop Improvement.

I saw an item a short time ago about a firm with a pay roll of $1,000,000 per annum, who voluntarily reduced the workday from 10 to 8 hours and installed conveniences for its employes which, after a year's trial, have resulted in a marked increase of output per capita. The care exercised by this company to have the best of conditions for its employes in the way of ventilation, sanitary arrangement, etc., brought back to my mind some of the foundries which I have worked in and others with which I am well acquainted. Many of these places are so illy ventilated that the society with the long name would have prevented a dog from remaining in one over night after a cast. Comfort for employes means not only good health and the best of spirits while at work, but also increased output and steadier workmen.

Some of the foundries I have worked in have been so old or cheaply built that it was an absolute impossibility to heat them, and many were that cold that molds froze solid in a little while after being made. The sand heaps were like ashes and pneumonia claimed fresh victims each day. When casting during the winter months so much steam was generated that there was a constant danger of getting burnt or breaking a limb. When the last stroke for the day was done one stood a good chance of barking his shins when groping his way from the shop.

In all the cases of molders' strikes with which I am acquainted, I have yet to hear of one being inaugurated for the purpose of seeking better ventilation or improved environments. A number of years ago, soon after the opening of the coal mines in Southern Indiana I alighted from the train one evening at one of the coal towns to answer a request to accept a job in a foundry there. I found the proprietor of the works seated in his comfortable steam-heated private office in a luxurious leather easy chair. When I made myself known to him he arose with a seductive smile, gave me the glad hand and thanked me for keeping my appointment on time. Hotels were not very plentiful and he secured accommodations for me at his brother's, whose place we reached after a ride over the roughest road I ever experienced. The drayman who had hauled me up there fired my effects into a room which was absolutely too dark to permit of seeing anything, after which I went into the sitting room and began to get a line upon my new boarding house, but, as Kipling says, "This is another story."

The next morning I went down to the works to take a look at the plant. There was a nice, neat, brick smithshop, machine shop, and office. A young man in the latter proceeded with me to a building which he pointed out as the foundry. I remarked that this had more the appearance of being an old barn than a foundry, when the office boy advised me that its owner insisted that this was all the foundry they needed for some time to come. As I approached closer my misgivings were verified. The foundry was nothing but an old barn built with boards running perpendicular. These had shrunk and many of the windows were broken and filled with old wearing apparel. I saw the cupola outside at one end of the building without the least bit of shelter, with an apology for a stage hanging to it somehow or other. All of these things I observed with the thermometer at zero. At the time all of this was new to me. It was my first experience in finding out what the woolly west really was. With much timidity I opened the foundry door and hesitating entered. I found the floor filled with molds ready, or nearly ready, to pour, all frozen and gray and solid as granite.

Around a pipeless, red-hot stove stood two men. One, who saluted me, proved to be the head gunner of the foundry. The other was

a helper. The former inquired of me if I was the expected new molder, and so on. I am pleased at this day to recall his acquaintance, as he was a fine, gentlemanly fellow, and a first-class foundryman, one of the few it is a pleasure to meet and ever remember. He informed me that no cast could be made that day, as everything was frozen as hard as a brick, but if they could get the feed pipe to the engine thawed out in time maybe they would be able to cast the next day.

Tomorrow came, the thermometer at 6:30 being at 32 degrees below the freezing point as on the day before. A few molds were opened to set cores and each presented the most beautiful picture of frost work which could be seen. Fine, needle like spears, miniature icicles protruded from inside the cope and horizontally from the side of the mold of about two inches in length, forming grottoes of fairy-like beauty.

I asked if they expected to save any of the molds, to which the molder replied that what they were after was to save the sand and that there was but one quick way of doing so, which was to pour the mold. No work could be done until the shop was thawed out. At last the sparks began to scintillate from the tapping hole, a premonition that the circus was about to commence, and if one was ever performed in a foundry it happened through this heat. All the molds kicked, mutinied, and explosions were the rule. In some instances, these went so far as to blow the bars right out of the cope, clamps broke, and there were runouts on all sides of us. Talk about being on the firing line, clothes and shoes were ruined, confusion reigned; volunteers came in from the machine and blacksmith shops to help out, instead of which they proved to be principally in the way.

I never was received with such warmth, notwithstanding the condition of the thermometer, as that cast provided for me this day. Not a mold was shook out, all being left in over night to prevent freezing up again. The next day it required considerable work to bring order out of the resulting chaos. I was given a 42-inch sheave to mold, bedding the same in the floor, also the ring which serves for a cheek to carry the groove. When I had the mold rammed up to the top joint I went to look for something which would do for the top part of the mold, and such an apology for a cope as I found. Its sides were but two inches in thickness and all sprung away from the bars, which were an inch away. Probably in our time all of us have seen just such flasks. The head molder, seeing my predicament, offered to help ram up the cope and shorten the time to prevent the joint from freezing, but in spite of our best efforts when we lifted it off there was as much as a riddleful of sand frozen which stayed down. The mold was mendable, however, if the proper facilities, spikes, nails, etc., could be procured. I asked a helper to give me some spikes when he inquired how many I would want. I replied that I was blessed if I knew, but told him to get a good lot of them, as they would not spoil in the kind of weather we were then experiencing. After a short time he came back with eight ten-penny nails and informed me that that was all there was on the place, or all they would let him have, at least. I was also informed by the helper that the boss of the pattern shop said that I should have used my sand wetter. This was the last straw that broke my courage, something snapped, and in a few minutes I had bidden good-bye to the chief mogul of the foundry, good fellow that he was.

Presenting myself to the owner, I informed him that if there was anything due me I would be pleased to receive it, as I had struck. He inquired my reason for quitting, and said that they proposed to pay me all I had asked before coming there. He informed me that I had, according to reports from the foundry, done better than any man they ever had, and he thought that when I got used to the work they would like me first rate, and ended by asking me what would satisfy me. I answered that while I felt very much flattered at what he said I could not for a moment consent to work under his methods of operating a foundry, and that my lonely strike was not inaugurated for more wages, one of the least considerations, but for a more comfortable shop, with better light, tighter roofs, ventilation, sanitary provisions, and all the things which go to make a shop agreeable to work in. Of course, he could not view the matter in my way, so the next train carried me out of that town.

L. C. JEWETT.

Metallic Phosphoro.

The New Era Mfg. Co., of Kalamazoo, Mich., are placing on the market Metallic Phosphoro, which they term a modern brass flux and bronze tempering metal. It is intended to take the place of phosphor tin in the

manufacture of high grade bronze and brass, and in general to replace that article in brass foundry practice.

It is claimed by the manufacturers that Metallic Phosphoro produces results superior to those obtained by the use of Phosphor Tin at about one-half the cost. They say they recognize that Phosphor Tin is an old and staple product, which has long been considered an indispensable article in a brass foundry, and that brass foundries are naturally careful about trying new things; yet to demonstrate the superiority of Metallic Phosphoro they offer to furnish free samples, something they would not be likely to do if this article did not possess merit. In the manufacture of bronze, Metallic Phosphoro is used as a tempering agent, producing a very superior quality of bronze which, as a high-speed bearing metal, the manufacturers claim is superior to any other product on the market. It offers more than ordinary resistance to the action of acids, and is also expected to prove of special benefit to those engaged in the manufacture of cheap jewelry.

Most brass foundries recognize the need of a flux of this character, especially for small castings. It is conceded that where a sluggish metal is used that remelting only aggravates the first cause of all losses.

Steel Molding as I Found It.

Although I hardly ever go on the road any more, I did recently manage to get myself shipped to East St. Louis, Ill., for the purpose of campaigning on steel, but I lost money in the deal. I worked about twelve and a half days, all told, at $3 per day, quit, figured up, found that I was about 5 cents short of my bridge fare if I walked, and 10 cents if I rode, so I frisked for the price and got across the river, and started for windy Kansas, with some sort of a mixed suit of clothing on that would be very hard to describe. But nevertheless, I got them all burned off of me at Aurora, Mo. I will tell you how I think it happened. While I worked in East St. Louis on steel, "Little" Pete Ward and Charley Trotwine, the foreman, told me that the harder I rammed, the better the castings would be. So when I went to work for Harvey Hall, at Aurora, Mo., he said he wanted me to stay straight and do the right thing, and I came very near doing the right thing for the whole town. He gave me some long engine bars, better known to the profession as grate bars, and told me to watch them. I have always been glad that he did not say "up," for I have never seen nor heard of the poor fellow that watched those bars "up." Well, anyhow, I went to work on the bars, thinking if hard ramming would make good castings in a large town like St. Louis, it would be just the stuff for a small town like Aurora, and, Oh, but I did give them the full limit of the law. I told the other molders that the vent wire was a thing of the past, a back number; that where I had been working in St. Louis a man would be called a fool if he even thought of such a thing. But I found out later I was wrong on that.

At blast time I was clamped up and ready. Harvey said to Harry Hogue, the melter, "let her go," and she went. I sat down and looked the flask over and decided that all was right. It was, even then, but later on was the time to be remembered. The iron came down good and hot, we went on pouring the soft work, and on about the third tap Harvey's commanding voice was heard ringing out in silvery tones, "Shaw, take that three hundred ladle and pour those grate bars." Homer Teade and I trotted the ladle under—she had a long, limber shank. We got her full, marched up and filled one flask. Just as I drew my breath to holler "short!" somebody attempted to say "up," but his voice was drowned by a terrific sound like that of the blowing off of a battery of steamboat boilers. Homer's end of the ladle shank hit the floor, first; my head hit the roof, second; fire bells rang; hook and ladder, hose carts, church bells, mounted police and everything on the go. Miners living in small home-made houses on the street east of the shop, left their homes and went in the direction of Springfield. Even the weather cock flapped his wings and sailed from the lightning rod on the city hall for parts unknown, and in a very short time I was gone. Have been in Kansas ever since. Will close by saying that I would be pleased to hear from some of the other brothers on the art of steel molding.—*Joe Shaw in Iron Molders' Journal.*

At the different foundries today the sand was so hard frozen that none of the molders could get up a full floor.—*Salem, Ohio, Herald.*

And This is 1902.

The Michigan Stove Co., of Detroit, Mich., has increased its capital stock from $300,000 to $3,000,000.